5th Annual PRESS TOOLING and PRODUCTION Feature Issue

The Magazine of

# TOOLING and PRODUCTION

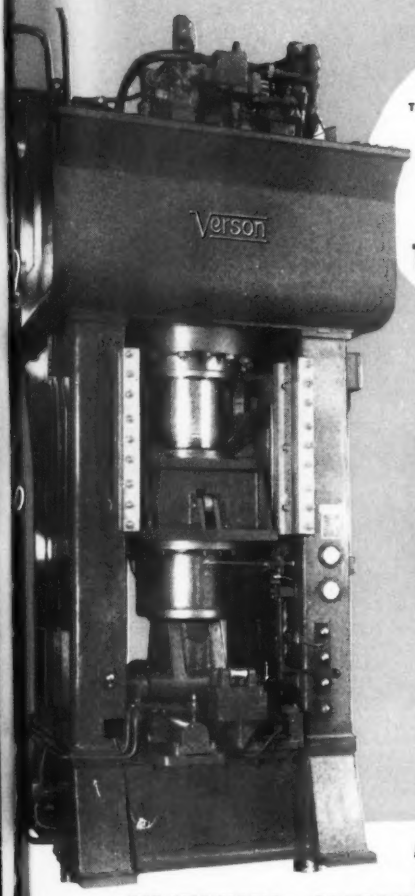
TOOL & DIE JOURNAL

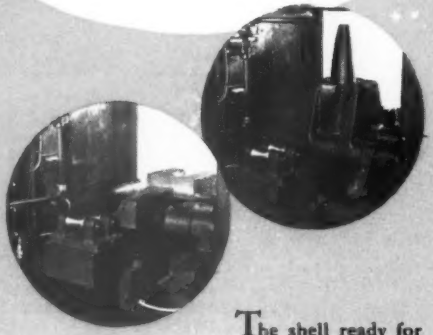
JUNE • 1951

THIS

TRADE Verson MARK

Automatic TOOL-UP
noses 150
155mm. shells per hour!

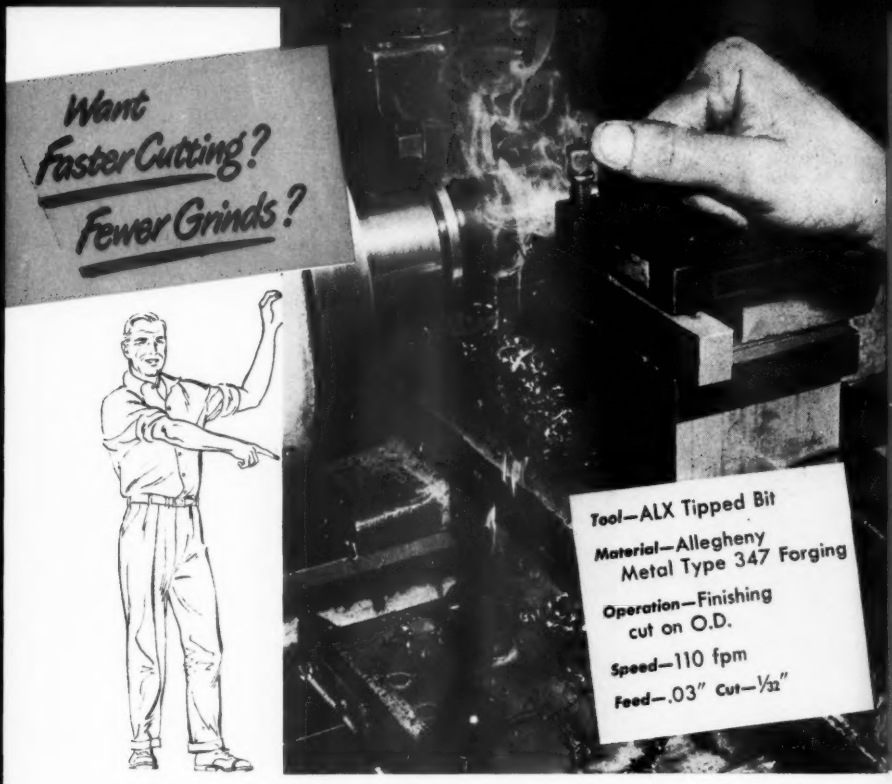


The shell ready for the nosing operation is automatically conveyed to the front of the press and into the open die pot which then closes (*above right*) and remains closed during the press stroke. After nosing, the die pot opens at the back (*above left*) and the shell is conveyed away from the press.

MECHANICAL AND HYDRAULIC PRESSES
AND PRESS BRAKES • TOOLING •
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

VERSON ALLSTEEL PRESS COMPANY
CHICAGO AND DALLAS




# . . . then get ALX ALLOY Cutting Tools

**Write for copy of**

**"ALX ALLOY TOOL BITS"**

An eight-page booklet tells how you can effect production economies by using ALX for fast turning, boring, and facing—in certain applications. Helpful information includes grinding, tool angles, speeds and feeds, brazing of tips. *Write for your copy.*

**ADDRESS DEPT. TD-18**

Many a machine shop—and probably yours—has jobs on which ALX Tipped Tools or ALX Solid Bits step up production by permitting increased speeds, feeds, and depths of cut. Resharpening is less frequent, the reason being special composition.

ALX is a cast-to-shape, nonferrous, cobalt-base alloy containing chromium, tungsten, carbon, and boron. The as-cast hardness of 60-62 Rockwell C obviates later heat treatment. Tools stay sharp at accelerated speeds and higher temperatures. Speed range is above that of high-speed steel, but lower than with carbide. At such intermediate speeds, the superior performance of ALX results from toughness, red-hardness, edge-strength, and abrasion-resistance values combined.

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● *Allegheny Ludlum Steel Corporation, Forging and Casting Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.*

For complete **MODERN** Tooling, call

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FINE TOOL STEELS
SINCE 1854

WAD 3485

MORE THAN EVER!

When the demand is for quality end mills—as it is today —Putnam is naturally working overtime. Every facility has been increased; end mills are going out the door as fast as they're produced. See Putnam for quality end mills and an honest effort to meet your needs.

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The Magazine of

# TOOLING and PRODUCTION

TOOL & DIE JOURNAL

1975 LEE ROAD • CLEVELAND 18, OHIO
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*TOOLING and PRODUCTION is published monthly for plant operating and purchasing executives and department heads in 50 types of end product and contract manufacturing companies.*

*Every copy is directed to such an individual by name, by title, and by company gratis. See CCA certification.*

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DETROIT 32, MICHIGAN

51-15


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Eight to ten hours' work cut to fifteen minutes in this unusual application of a versatile Cincinnati Shaper.

Hand scraping the mating surfaces of press bed bolsters required eight to ten hours. On this Cincinnati Shaper the lapping operation replacing the hand scraping method takes only fifteen minutes.

Versatile Cincinnati Shapers, with low tooling and set-up costs, bring to your shop a money-saving "handy man."

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A great variety of shapes are automatically machined with tracer control.

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proved on every machine

*more production*

*lower costs*

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"CB" MASTER COLLET
U. S. PATENT NO. 2,228,337

Balas Master Collets for all multi-spindle automatics from ⅛" capacity and over.

Balas Master Collets reduce set-up time because they are front loading . . . the pads are easily changed without disturbing the setting of the collet. They run truer, grip tighter and work faster, increase your production and lower your costs regardless of the make of machine or type of material you use. In addition, Balas Master Collets handle stock to full capacity of the machine, thereby reducing collet inventory.

# BALAS PUSHERS

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Balas Master Pushers for all sizes of automatics furnished with steel, cast-iron, bronze or hardened Meehanite pads depending on the requirements of the job.

Balas Master Pushers eliminate lost production time by permitting rapid change-over from one stock size to another by merely changing pads. The unique design and construction of these pushers guarantee long trouble-free operation. Balas Master Pushers solve your difficult feeding jobs and speed up your production. They have proved to be outstanding "time-and-money-savers" on all types of machines in thousands of large and small plants throughout the nation.

Most standard sizes of Master Collets and Master Pushers are carried in stock for immediate delivery to you.

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*WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY*


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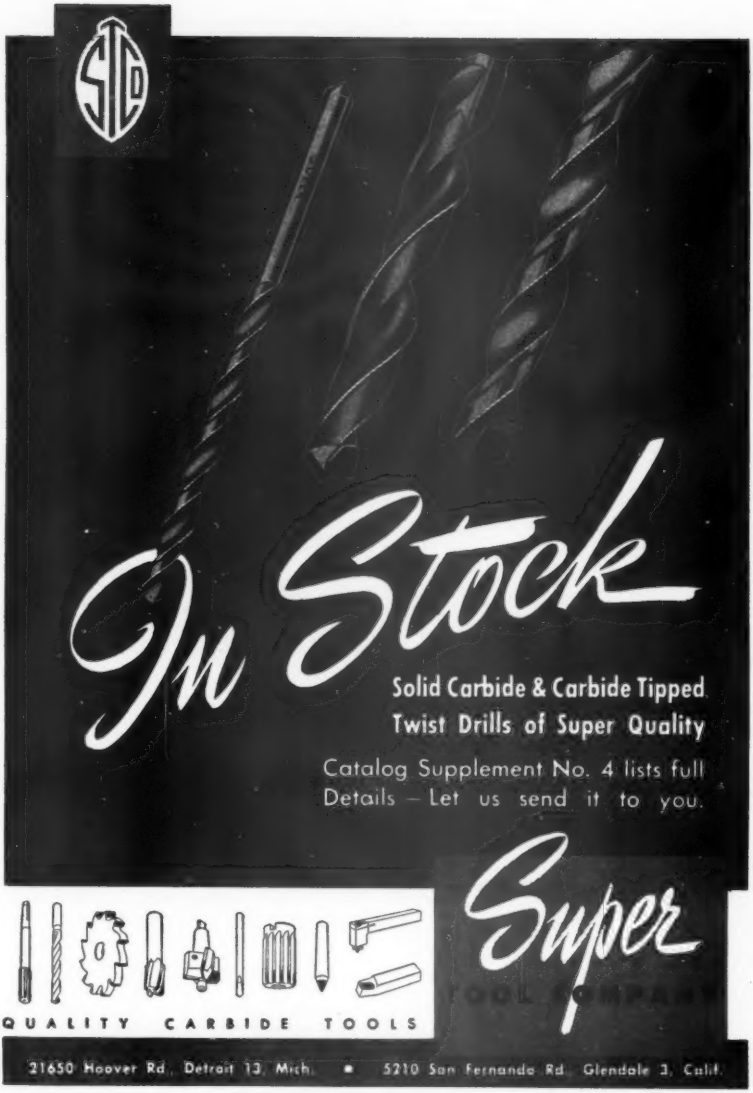
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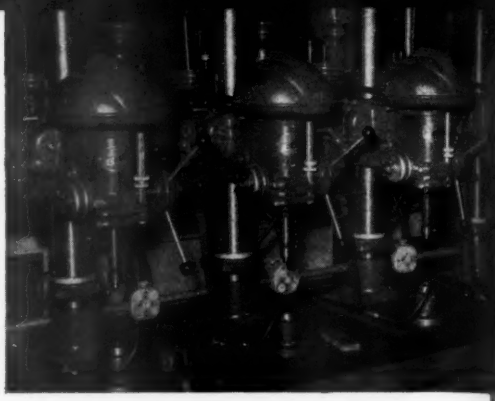
# HOW Four Companies Adapted Delta Tools TO CUT COSTS, UP PRODUCTION



**1 SIMPLIFIES ACCURATE LOCATION OF WORK PIECES**

***Bowen Products Corp., Ecorse, Mich.*** Locating fixtures, properly positioned beneath spindles, were bolted directly to the table of standard 4-spindle Delta 17" drill press. Fixtures are easily removed when job requirements change.

**2 EASY DRILLING OF HEAVY CASTINGS**

***Racine Pattern Works, Racine, Wis.*** For drilling large awkward castings, the regular base of standard Delta 17" drill press was replaced with 3-leg spider base, so that drill press can be easily slid to proper positions along flange of heavy bathtubs instead of moving work.

**3 ROLLS DRILL PRESS INTO POSITION**

***Cessna Aircraft Co., Wichita, Kans.*** A roller bridge carries standard Delta drill press along entire length of airplane main spar or backbone, clamped to work table, for accurate positioning.

**4 REDUCES FATIGUE, DOUBLES PROTECTION**

***Suprex Gage Co., Ferndale, Mich.*** For locking a precision gage, Delta 17" drill press heads are mounted sideways, with special fixture. Company uses girls as operators, reports doubled production, reduced fatigue.

# *There's a Delta Power tool for your job...*

**DELTA WOOD AND METAL WORKING TOOLS—**

**53 MACHINES — 276 VARIETIES — MORE THAN 1300 ACCESSORIES**

*For Delta dealers, see your Classified Phone Directory under "Tools"*

DELTA MILWAUKEE

DELTA POWER TOOL DIVISION

**Rockwell**

MANUFACTURING COMPANY

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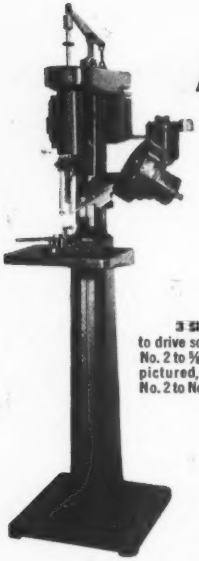


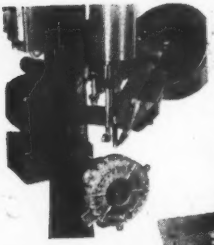
3 SIZES
to drive screws from No. 2 to ⅝". Model A pictured, Capacity No. 2 to No. 6 screws.

# ADD "Jet Plane Speed"

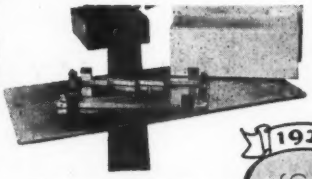
## To Your ASSEMBLY JOBS With These Versatile

## DETROIT POWER SCREWDRIVERS

Banish slow, dragging hand methods that eat into your profits. Drive screws with almost incredible speed by using Detroit Power Screwdrivers, the outstanding hopper-fed machines that pay for themselves quickly, then pay big dividends in stepped-up production and lower labor costs—they drive screws as fast as one a second, doing a perfect job without damage to heads or threads . . . all types of screws . . . driven to uniform tension. So, if your assemblies are fastened with screws, take off now to record-breaking assembly speed by adopting Detroit Power Screwdrivers. Let them prove their indispensability in your plant.



Vertical type, manually operated fixture assembling screws around outer periphery of cylindrical die casting.



Driving twenty screws in cabinet side shields in 57 seconds.

**Send for further details, also information about D.P.S. Motorized Hopper Units, Nut Drivers and Special Assembling Machines.**

1926 Our 25th ANNIVERSARY 1951

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## CUTTER GRINDING MANUAL

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**MORE PRODUCTION FROM THE INGERSOLL CUTTER GRINDER**

**THIS MANUAL TELLS...**

What basic grinds and clearance angles to use for different materials and types of cutters.

How to duplicate a grind each time a cutter is resharpened.

How to get better finishes and longer tool life.

How a spin-grinding attachment saves time in grinding blades to equal height.

How cutter performance can be improved by proper inspection.

*WRITE FOR YOUR COPY*

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

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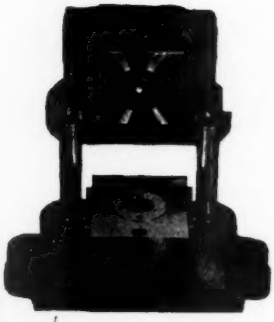
# "A MUST wherever WASHERS are made!"

# HOVIS

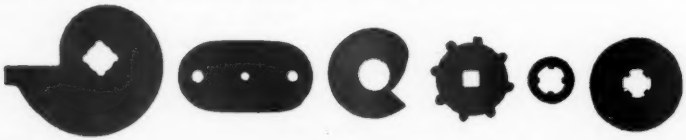
## OFFERS YOU THIS SIMPLE, UP-TO-THE-MINUTE METHOD

**There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.**



**Made in 5 sizes:**
**¾"—1½"—2½"—4"—6".**

***Write for literature.***



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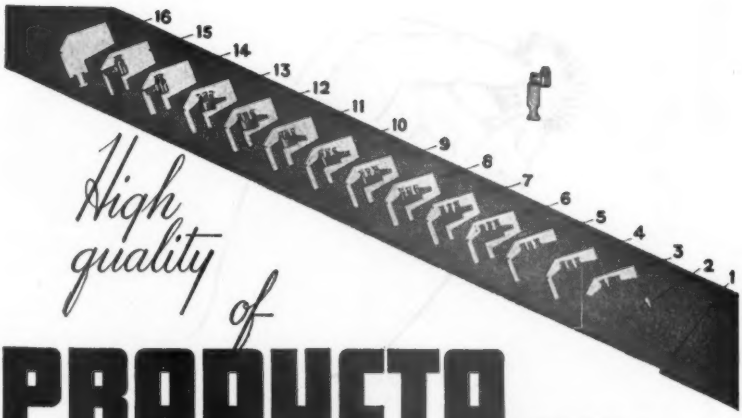
RADIALLY RELIEVE
your cutting tools
Inter-changeable cams and index plates for 1 to 14 flutes.
Inter-changeable collets up to 1.125" D.
Preloaded ball bearing spindle.
Easy-to-read settings. Easy to set up.
Base swivels for angular grinding.
Mounts on most grinder tables.

D•S is at work in grinding rooms across the country producing better cutting, longer lived taps, counterbores, step drills, center drills, etc. Available in hand operated and motor driven models. Have you investigated it? Write today for catalog.

D•S GRINDER DIVISION
**ROYAL OAK TOOL & MACHINE CO.**
621 E. Fourth St., Royal Oak, Mich.

**D•S RADIAL RELIEF GRINDER**




*High quality of*

# PRODUCTO

## DIE SET

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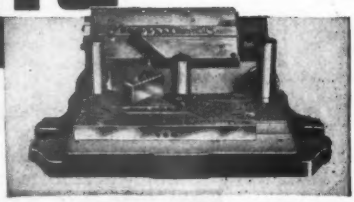
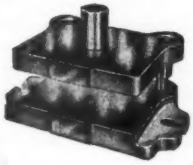


This tiny (.502" overall) electrical connector for a miniature radio tube was stamped and curled to form a wire gripping tube from a copper strip 1" wide, .010" thick. The 16 station progressive die* was mounted on a Producto Die Set, so highly accurate that die sections were profile ground to ± .0003" and punches made to fit with clearance of .0002" between punch and die. Only the precision quality of this Producto Die Set allows such close tolerance work.

Call "Producto" in Classified Telephone Directory for Catalog or Special Die Sets . . . fast delivery . . . highest quality.



* Die designed and made by Globe Tool & Gauge Works, Boston, for National Co., Inc., Malden, Mass.

**OPERATIONS CHART**

1. Notch (for guide)
2. Pierce hole
3. Pierce to shape
4. Pierce to shape
5. Idle
6. Pierce for tube
7. Idle
8. Preform fingers
9. Form tube
10. Form tube
11. Precurl, started
12. Precurl, continued
13. Idle
14. Curl completed (45° angle plunger)
15. Idle
16. Blank out

**THE PRODUCTO MACHINE COMPANY**
970 HOUSATONIC AVE., BRIDGEPORT 1, CONN.

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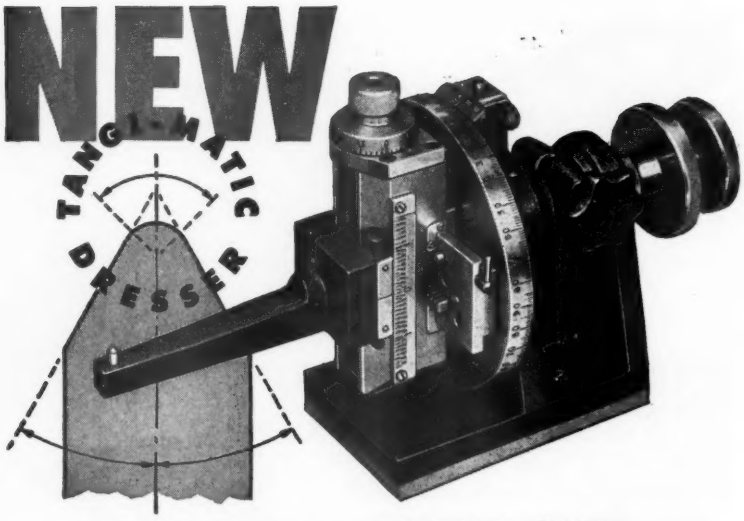


## can save you HOURS daily

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The Perfex TANGI-MATIC is made by master gagemakers who specialize in gages and other precision instruments. All wearing parts are of steel, hardened, ground and lapped for a long life of precision service. The lead screw is hardened and ground to extremely close tolerances. Carrying case furnished for TANGI-MATIC and Master Setting Gage. Write for literature. And for all thread, plug and ring gage requirements, remember the Perfex reputation.

**PERFEX GAGE & TOOL COMPANY**

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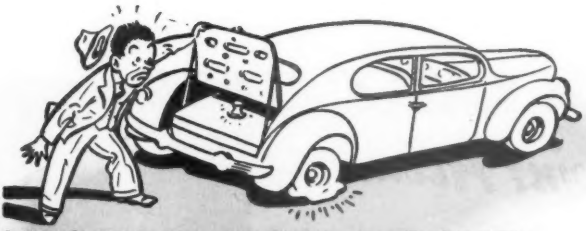

# WOULD YOU DRIVE WITHOUT A *Spare?*

***"Just my luck! A flat tire and no spare! What a predicament!"***

A machine shop foreman may be in a worse predicament without a spare arbor. When an arbor breaks, production ceases until the arbor is replaced. Machine and manpower hours wasted! Schedules disrupted! Deliveries delayed! That's why we say —

***It Pays to Have Several Arbors in Stock***

Arbors are "perishable tools" and today their cost is relatively small in comparison to lost hours and disrupted schedules. So play safe! Order your spare arbors today. Remember, Kempsmith Arbors are now available in all popular sizes and types, adaptable to any make of milling machine with standardized spindle.

THE KEMPSMITH MACHINE CO., 1829 S. 71st St., Milwaukee 14, Wis.

***Get Your Copy of this NEW ARBOR BULLETIN***

Describes the complete Kempsmith line of Arbors and Accessories. Also gives you helpful information on how to keep your arbors in condition. Fill in and mail coupon — today. No obligation.

*Arbors* BY

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• *Precision Built Milling Machines Since 1888* •

**Contact Your Local KEMPSMITH Dealer When in Need of Milling Machines, Attachments, Arbors and Accessories**

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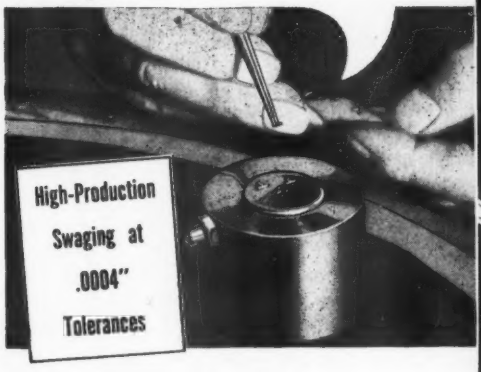
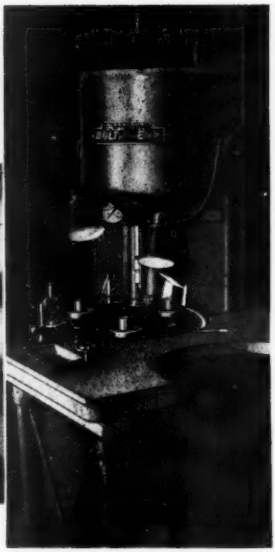
# 4 Tons of *Pin-point Accuracy*

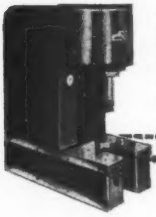


## *MULTIPRESS*® puts a microscopic peak on a tiny Elgin Watch part

An almost microscopic tip required on one end of the tiny watch parts you see on the man's fingers, above, must be accurate within .0004 of an inch! Multipress swages those tips *at the rate of 7000 per day*, at the Elgin National Watch Co., Elgin, Illinois.

The 8-ton Multipress is equipped with a 6-station indexing table featuring skip-station accessory control. Precision dies are mounted at three of the six stations. The skip-station accessory permits the table to by-pass untooled stations without loss of time.



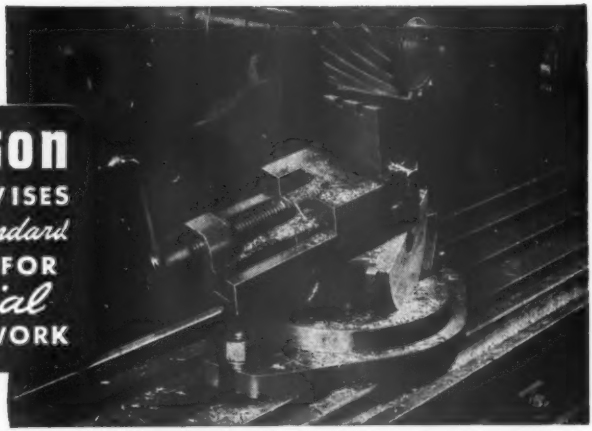
The index table operates in positive sequence with the press ram through the control system of the press, in a continuous cycle. As the ram—preset to deliver a 4-ton effort — swages one of the parts, others are loaded into the other two fixtures. An ejector cam under the table beyond the ram station lifts finished parts out of the dies, and a jet of air whisks them into a tote box.

Multipress delivers its full force by a quick build-up rather than sudden impact. This gives the metal time to *flow* into shape, with better results, higher accuracy and less spoilage.

Multipress advantages on this operation (formerly handled on a drop hammer) include easier maintenance of close tolerances, faster production, increased safety, less noise and vibration, and space-saving design. These advantages have been proved on many other production jobs. Multipress can be tailored to your needs in any of eight frame sizes—1 to 50-ton capacities.

**The Denison Engineering Co.**
1197 Dublin Road, Columbus 16, Ohio

**DENISON** *Hydr*Oil*ics*



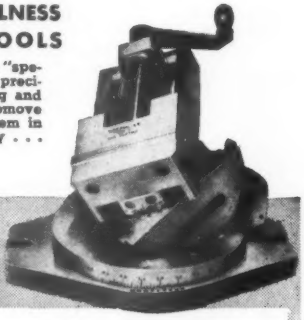
# WESSON ANGLE VISES USE *Standard* TOOLS FOR *Special* ANGLE WORK

## FOR MORE FLEXIBILITY AT LESS COST!

**These are high precision, top quality, 3-way angle vises that can be relied upon to slash set-up time on difficult compound angle machining with standard machine tools. Save many man-hours . . . quickly liquidate the vise cost . . . assure uniform angle accuracy in toolroom or production duty.**

## ORDER NOW—*Multiply* THE USEFULNESS OF YOUR *Standard* MACHINE TOOLS

**Standard machines can be transformed instantly into "special" angle machines with WESSON Vises . . . for precision angle milling, drilling, grinding, tool sharpening and many other difficult angle machining jobs. You can remove vise without altering set-up. Buy several — use them in series on many machines . . . save time and money . . . boost production!**



**WESSON** *Universal* **VISES**
BUILT TO WESSON STANDARDS OF QUALITY AND PRECISION

Name and Title

Firm Name

Address

City State

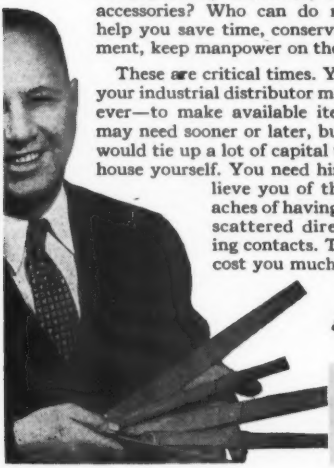
**WESSON PRODUCTS CO.**
**1220 Woodward Hts. Blvd.**
**Ferndale (Detroit 20), Mich.**

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# When the chips are down . . .

## who's your standby?



YOUR industrial distributor*, of course. He is your nearest, quickest, surest source of supply. Who else offers a concentrated supply of so many manufacturing requisites? Who else is more likely to know where and how to obtain scarce or sorely needed tools, machines, supplies, accessories? Who can do more to help you save time, conserve equipment, keep manpower on the go?

These are critical times. You need your industrial distributor more than ever—to make available items you may need sooner or later, but which would tie up a lot of capital to warehouse yourself. You need him to relieve you of the headaches of having a lot of scattered direct-buying contacts. They can cost you much in time and effort. You need him to expedite purchase orders and deliveries.

Also . . . your industrial distributor has up-to-date information that is often invaluable to hard-pressed production heads—especially in selecting the best tools or equipment for different manufacturing operations.

Take files: With a vast assortment of existing regular types, cuts and sizes—and scores of special types for special purposes or materials—your distributor's knowledge of *The right file for the job* is of incalculable help on both exacting and mass-production work.

Marketing through distributors is a policy that has made Nicholson products obtainable and preferred by the largest host of file users under the sun.

NICHOLSON FILE COMPANY
95 Acorn St., Providence 1, R. I.
*(In Canada, Port Hope, Ont.)*

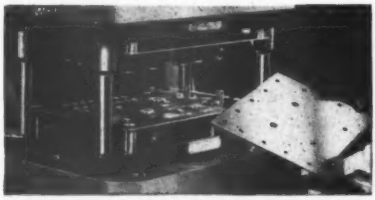
NICHOLSON
*...A FILE FOR EVERY PURPOSE*

# New • Fast • Proven LOW COST methods for PERFORATING and NOTCHING SHEET METALS

**Both methods feature: LOW DIE COSTS**

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION** – Down time is minutes as compared to hours for changeover. For precision work in all types and sizes of presses. **START PRODUCTION *at once.*** Pierce up to ¼" thick mild steel. Saving money in the best known plants.

**Whistler *MAGNETIC* Dies** at work in large inclinable press. Magnetized units hold the retainers. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.



**Whistler *ADJUSTABLE* Dies** on ⅛" steel perforating and notching job, using Tee slotted die set. With Whistler Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

NAME

FIRM

ADDRESS

CITY ZONE STATE

## S. B. WHISTLER & SONS, Inc.

*Adjustable, Magnetic, Custom and Cam Dies for all Industry*

**748 Military Road** **Buffalo 23, New York**

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

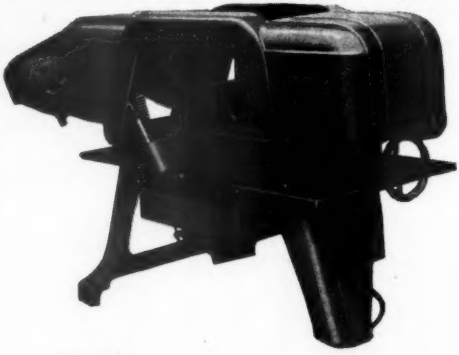
# THEY CUT AND CUT AND CUT

## Every JOHNSON Metal-Cutting BAND SAW

**Is a Bear for Work and Lasts Indefinitely**

When you buy a Johnson Band Saw you can be sure it will stand up and deliver constant service year after year. Johnson Saws are ruggedly built from the best standard parts available. They are adaptable to any cutting job, requires only a minute's time to change from light to heavy stock. For extra capacity, accuracy, speed and economy, insist on a Johnson with its many outstanding features.

Model J, pictured, 10" x 18" Capacity, available as a wet or dry cutting machine. Junior Model B, (with or without casters) 5" x 10" Capacity.



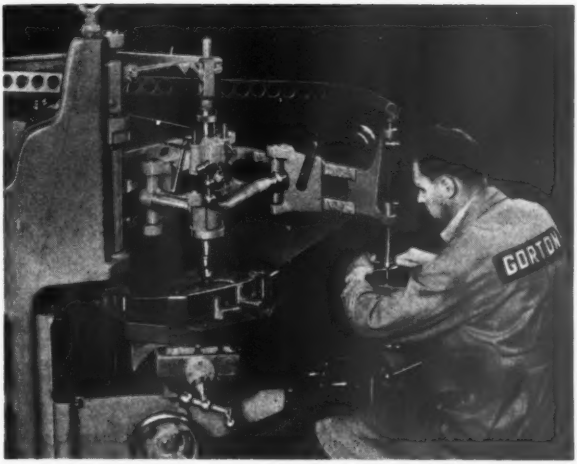
**Model J**

**There is a Dealer near you.**

**JOHNSON MANUFACTURING CORP.**

ALBION, MICHIGAN

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION




Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

# Special Machine Tools Speed Production During Rearmament

by
GEORGE GORTON III
Executive Vice-President,
George Gorton Machine Co.

INDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

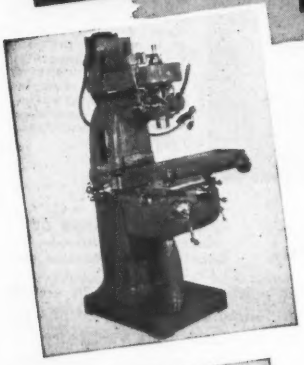
Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

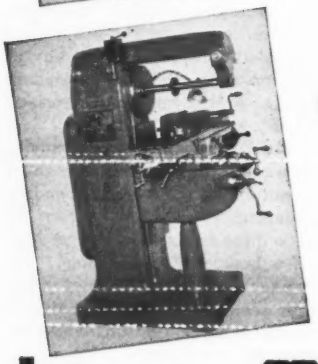
A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1206 Racine St., Racine, Wisconsin, U. S. A.

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

MAKE INDEX Your Choice

Get a Head Start on Production with these RUGGED, VERSATILE, EXTRA CAPACITY MILLING MACHINES





Whether it be the heaviest jobs or light production, you will find these improved, low-cost machines ideal for the purpose. They offer speed and precision to meet present-day stepped-up schedules, while assuring a substantial saving in time and labor. Get details about their many advantages now.

**Model 55** IMPROVED VERTICAL MILL. A speed range of 80 to 2700 RPM's combines with a 1 H.P drive, 3¼" quill, and extra rugged spindle mounted on over-size precision ball bearings to give a capacity of ⅛" to 1½" end mills in steel. Spindle quill travel is 5¼" either by lever, hand wheel, or power, and has adjustable positive stop and automatic safety throw-out. Table 40" x 9" or larger. Longitudinal table power feed has 8 geared feed changes.

**Model 60** PLAIN HORIZONTAL MILL. A full No. 1, that in many ways equals or exceeds a light No. 2 in capacity. Low maintenance due to all rapid moving parts running in oil, hardened alloy gear train, and fully ground alloy steel spindle mounted on pre-loaded precision ball bearings requiring no adjustment. Standard table 40" x 9" overall, with larger table optional, is supported by 18" of saddle bearing, and has accurately ground lead screws for transverse and longitudinal movement. Constant flow coolant system of 8 gallon capacity starts and stops with spindle.

*Write for Literature*

INDEX MACHINE CO.

541 N. MECHANIC STREET JACKSON, MICHIGAN

*Defense Contracts*

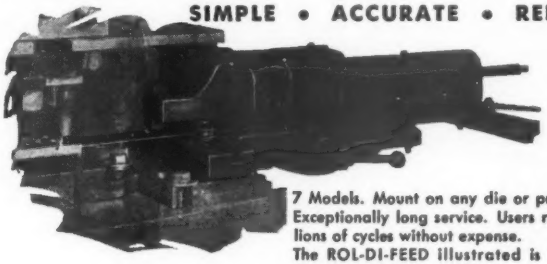
CALL FOR SPEED AND PRODUCTION!

DICKERMAN AUTOMATIC

**PUNCH PRESS FEEDS**

*Increase Production to 500%*

SIMPLE • ACCURATE • RELIABLE



7 Models. Mount on any die or press. Exceptionally long service. Users report millions of cycles without expense. The ROL-DI-FEED illustrated is especially adapted to feeding strip.

•INCREASE YOUR PRODUCTION WITHOUT INCREASING YOUR MANPOWER.

**NO ALLOCATIONS OR RESTRICTIONS**

*Available from dealer stocks right now!*

You can handle larger contracts now with your present plant and with no increase in employees. Take advantage of the phenomenal production increases afforded by Automatic Punch Press Feeds. Write today for details.

**H. E. DICKERMAN Manufacturing Co.**

323-621 ALBANY STREET, SPRINGFIELD, MASS.

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# *Why* A·B·C Bushings

## Last *as much as 10%* Longer

Since the inception of this business, we have used only steel containing chromium and/or tungsten • That's why A·B·C Bushings deliver as much as 10% longer service than the average • When a supplier decides to "up" the quality of his steel, it may be a couple of years before his customers get the benefit of the change, their orders in the meantime being filled from stock or blanks antedating the improvement • With A·B·C Bushings, steel of chromium and/or tungsten content is no recent innovation. They've *always* been made from this superior grade steel • That's why it is always good business to specify A·B·C.

**A·B·C DRILL JIG BUSHINGS**

HEADLESS PRESS FIT • SLIP RENEWABLE • FIXED RENEWABLE • HEAD PRESS FIT

Also Headless Liners, Locating Jigs, Lockscrews, Clamps

A·S·A STANDARD

**Unexcelled for Accuracy and Concentricity**

*Write for catalog, price list and other information needed by the tool engineer.*

**ACCURATE BUSHING COMPANY**

**437 NORTH AVENUE, GARWOOD, N. J. • Westfield 2-6400**

ABC TRADE MARK

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"UP-ING UNCLE'S MUSCLE"

Bay State internal wheels have been "inducted" for a host of Defense Jobs . . .

Aircraft Cylinder Sleeves
Anti-Friction Bearings of All Kinds
Gun Barrels
Propellor Hub Cones
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Aircraft Crankcase Assemblies
Cartridge Dies
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*Ask for Bay State engineered-help on your next job.*

★THE ABRASIVE PRODUCT
Bay State Internal Wheels . . . Quality Control Manufactured in Fractional Grades.

★THE GRINDING JOB
Internal Grinding Crank Holes in Four Aircraft Conn Rods Simultaneously.

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**BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.**

*Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh*
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★ KEEP AMERICA STRONG ★


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

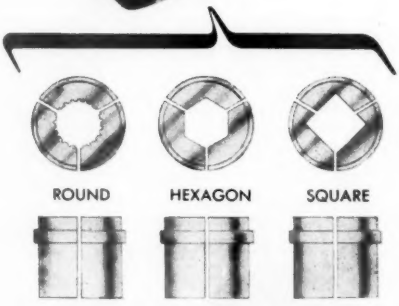
HARDINGE
ELMIRA, N.Y.

# Style "S"

## SURE-GRIP Master Collets and Pads

Multiple spindle automatics equipped with Hardinge Master Collets and Pads give solid collet performance—at low cost. Pads are interchangeable among different machines with same capacity. Available for all sizes of the following machines up to and including 3 ½" capacity:

CLEVELAND
CONE
GREENLEE
GRIDLEY and ACME-GRIDLEY
NATIONAL ACME
NEW BRITAIN




*Ask for Style "S" and Style "B" Bulletins which give all performance features, price savings, and ordering information.*

HARDINGE
ELMIRA, N.Y.

# Graph-Mo steel cam machines 25 to 30% easier—and stays precise after 40,000 hours' operation!

Makers of the Ferguson roller gear drive were looking for a steel for the cam that would be extremely wear-resistant, yet easy to machine. The steel they were using caused high cutter-breakage.

Metallurgists at the Timken Company recommended Graph-Mo steel. Ferguson reports these results: "Graph-Mo improved machinability 25 to 30%. There is little or no distortion in heat treating—good surface wear. We do not know of a cam ever wearing out. Precision has been maintained on multi-color printing presses—without replacement of cams—after more than 40,000 hours of actual running time."

Graph-Mo is one of four Timken® graphitic tool steels. Because they contain free graphite, they machine faster and easier than other tool steels. This free graphite, together with diamond-hard carbides formed during heat treatment, provides excellent resistance to wear and abrasion. Other advantages are superior non-seizing qualities, good stability, less tendency to scuff and score, and uniform response to heat treatment.

For information on Timken graphitic tool steels—and their wide application for gages, dies and machine parts, get the new edition of the "Timken Graphitic Steel Data Book." The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Cable address: "TIMROSCO".

**TIMKEN**

TRADE-MARK REG. U.S. PAT. OFF.

*Fine Alloy*

**STEEL**

*and Seamless Tubes*

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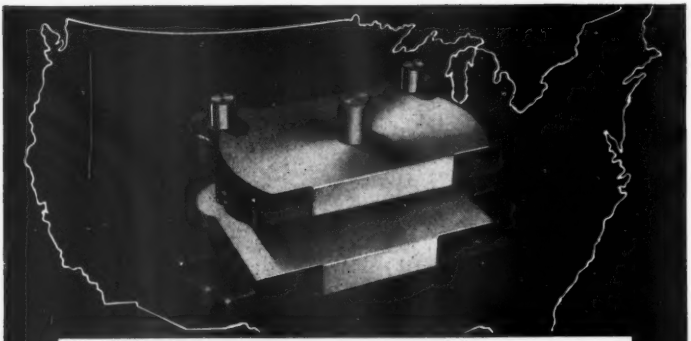

**DETROIT DIE SET COVERS INDUSTRIAL AMERICA**

YOU will find that the Detroit Die Set representative near you can give you fast action on micrometric jig-bored die sets. Prompt delivery is made from the factory, where every set is assembled and precision inspected. Phone your "DETROIT" representative for information on standard or special die sets, or high-precision die-maker supplies.

*CALL "DETROIT"*

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DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICH.

DETROIT DIE SET ★

Portelvator; fixed position; pit installation for positioning truck and trailer beds to loading platform.

Portelvator; portable, elevating, tilt top; to facilitate removal and emplacement of bus motors.

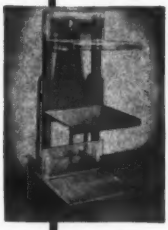
Portelvator; portable, elevating; for the movement and positioning of automobile body dies.

Portelvator; fixed position, automatic, self-leveling; for sheet feeding operation.

Portelvator; fixed position; pit installation for "below and above floor level" operation; sheet feeding.

Portelvator; standard style "A"; capacity, 2000 pounds; lift, 15".

Portelvator; fixed position; basement installation for extra high lift from ground floor.



Portelvator; standard style "S"; capacity, 1000 pounds; lift, 52".

Portelvator; fixed position, roller top, elevating, die transfer table; self-loading and self-discharging; capacity, 25 tons.

*Focus*

on the

## MOVEMENT and POSITIONING

of

## TOOLS and MATERIALS

The devices shown here are typical of standard and special PORTELVATORS© regularly used by industry to effect the smooth movement and accurate positioning of tools and materials. The record of production economies brought about by the use of such devices is astounding.

Doubtless the application of a similar device will improve your production also. We will be happy to furnish you with details of construction and operation. Ask also for our Bulletin P-502 which gives full particulars about standard Portelvators.

THE *Hamilton* TOOL COMPANY

832 SO. ...NTH STREET • HAMILTON • OHIO • U • S • A

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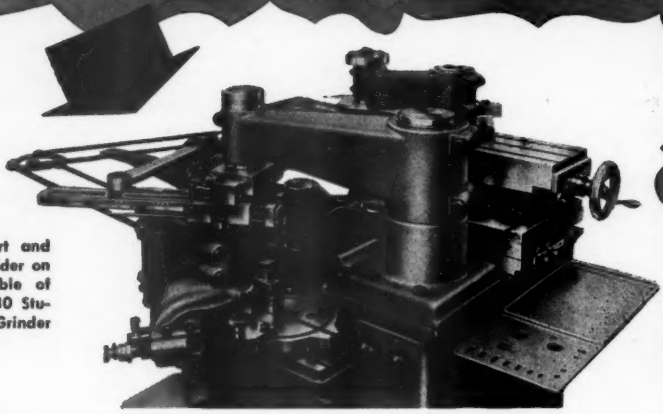
# GRINDING PROFILES?



Work Support and Diamond Holder on Indexing Table of Type PSM-130 Studer Profile Grinder

# USE THE STUDER

**TO PRODUCE** — Profile Gauges, Sectional Dies, Flat and Circular Form Tools and many other profile parts to a tolerance of ±0.0002"

**TO INCREASE PRODUCTION** — One Wheel will Grind Profiles up to 6" long in One Continuous Operation. Eliminate Milling Operations on small pieces.

**CAPACITY** — Type PSM-130 Grinds Profiles up to 6" in length. Handles circular work up to 4" diameter and flat pieces up to 2" thick.

A LARGER STUDER PROFILE GRINDER (Type PSM-250) which grinds profiles up to 11" in length, circular work up to 10" diameter and flat pieces up to 4½" thick, will be available early in 1952.

*Additional STUDER Products—High Precision Universal and Surface Grinders*

• Other Machine Tools for the Tool and Stamping Industry

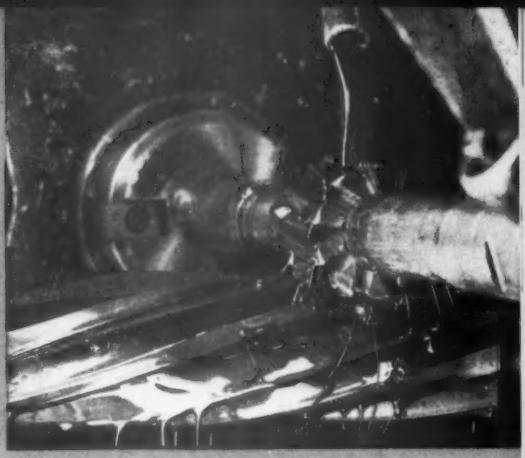
| DECKEL | NASSOVIA | ESSA | STUTZMANN |
|---|---|---|---|
| Universal Copy-Milling & Die-Sinking Machines, Universal Millers, 2 & 3 Dimensional Engraving Machines, Universal Tool and Cutter Grinders. | Die-Sinking Machines (Larger Type) | Large Shaving Presses | Small Shaving Presses |

COSA is your source for all types of Precision Machine Tools — from small bench lathes to large boring mills.

COSA CORPORATION

405 Lexington Ave. Chrysler Bldg. New York 17

# PRATT & WHITNEY MILLING CUTTERS



## SPEND LESS TIME IN THE GRINDING ROOM ...WORK MORE HOURS PER DAY

Consequently they produce more per man (or per machine) and simultaneously effect savings in stopped-time and service grinding . . . important factors in today's program of production for defense.

What's the reason? Pratt & Whitney's all-inclusive and exacting control of design, materials, manufacture, heat treatment and surface finish . . . based on knowledge and experience gained from serving the metal cutting industry for more than 90 years.

With P&W cutting tools, you'll get performance that pays off with lower costs as a result of longer tool life, better work and more of it, with greater accuracy. Order them with confidence — any size, any shape — from your nearby Pratt & Whitney Branch Office.

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**P&W MILLING CUTTERS**
**—Important factors in today's Production for Defense**

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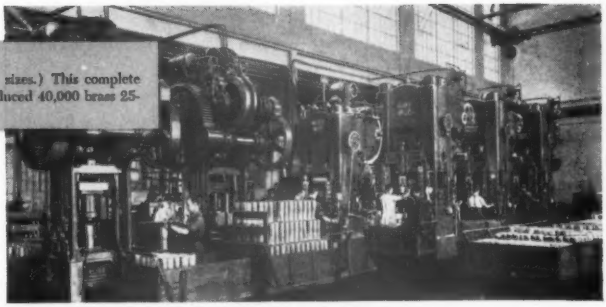

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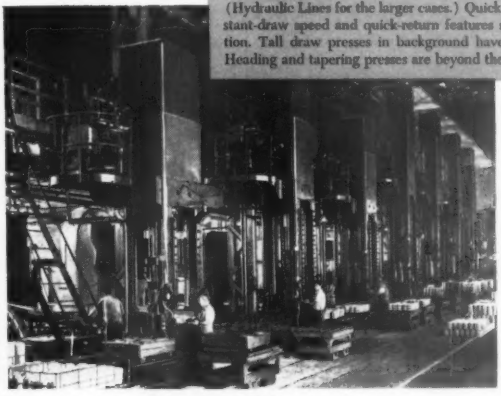
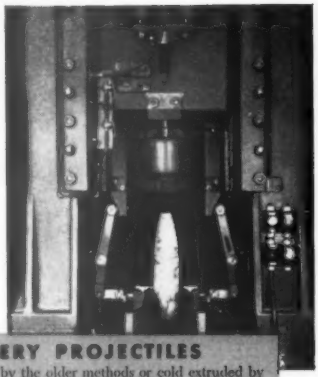


**ARTILLERY CASES**
(Hydraulic Lines for the larger cases.) Quick advance, constant-draw speed and quick-return features speed production. Tall draw presses in background have 108" stroke. Heading and tapering presses are beyond them.



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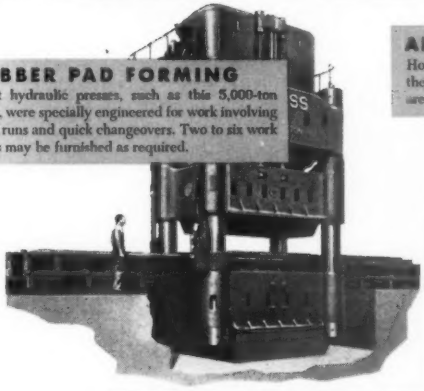

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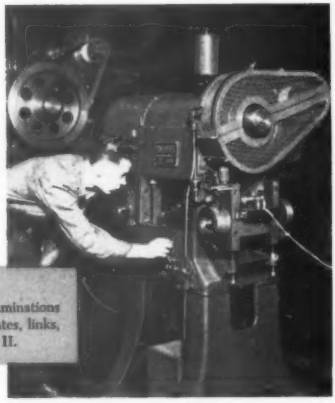

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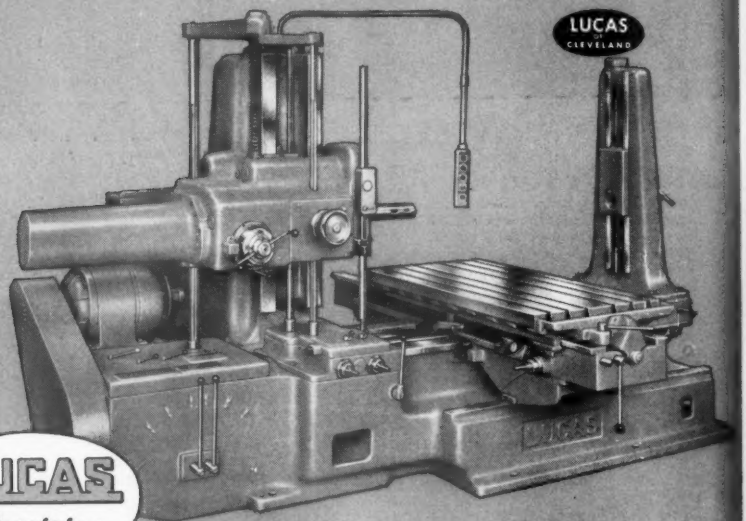


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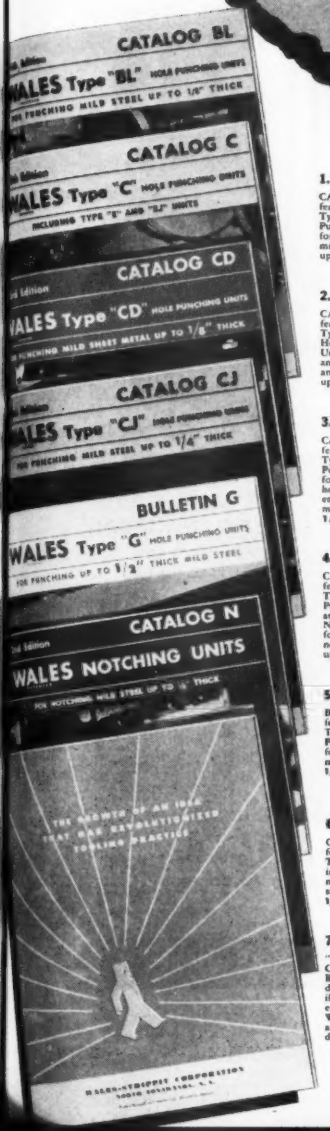


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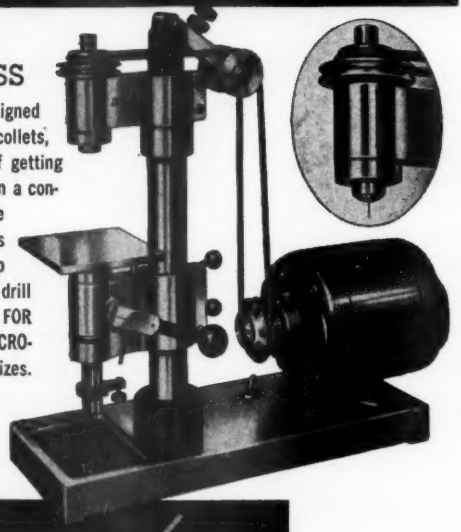

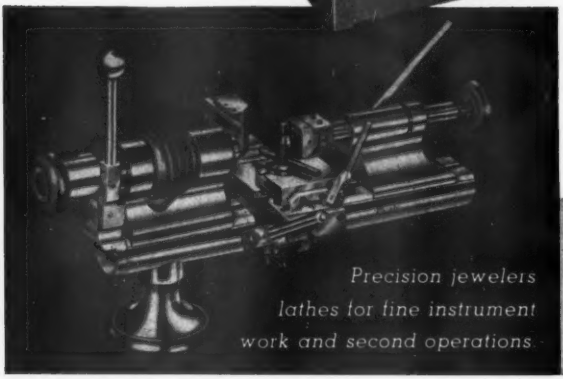

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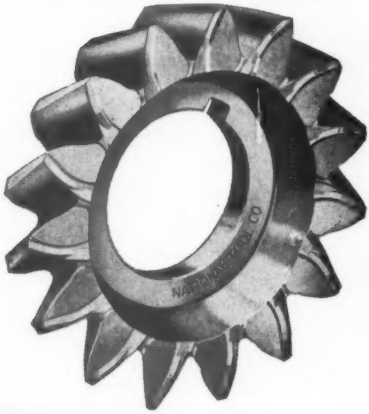

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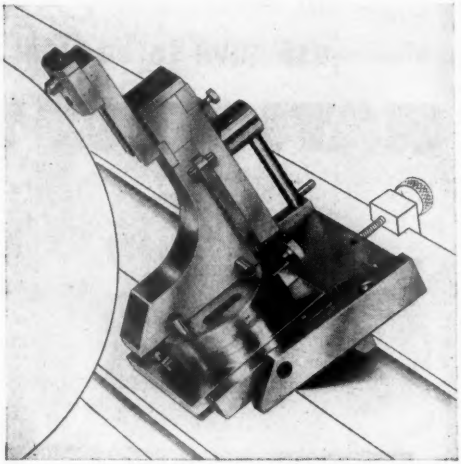

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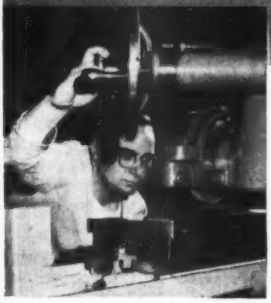

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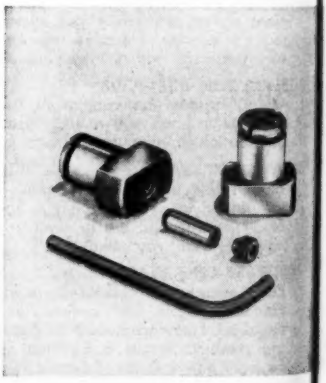

**Jergens TOOL SPECIALTY CO.**

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*editorial*

# from high school to hierarchy

We were very pleased recently to see a statement to the effect that tool and die makers "still constitute the hierarchy of industrial production personnel."

Disregarding, for the sake of technicalities, the literal, dictionary definition of "hierarchy" (even we can't string along with the idea that tool and die makers are in a class with the angels on high), the statement was sincere, complimentary and inspirational.

Further, considering that the source of the statement was one of the country's larger employers of industrial personnel, it carries appreciable authority.

Another industry spokesman said, in view of the increasing allotment of defense contracts, that the skilled mechanic is "scarcer than a pearl in a platter of oysters," and that competition (between employers) to secure experienced and skilled employees is "tobasco hot."

In this month's story on die construction and repair, R. H. Groman says, "Unfortunately, die design has not as yet been perfected to the status of an exact science, and much of the work is based on empirical formulas and individual experience, . . . " That means the experience and know-how of the skilled designer and builder.

This all boils down to a most important and attractive picture to the high school student who is giving increasing thought to his choice of a carrer; to how he can best fit himself to attain not only a high standard of living but that degree of security that comes with the acquisition of experience and skills that are in high demand and which give every promise of continuing in high demand.

But pictures have to be seen to be appreciated.

How many of you busy production supervisors, operating vice-presidents, chief designers and methods engineers, are sufficiently sold on your jobs and your industry to have ever attempted to convey to a high school student an idea of what it is all about? Today's youth is so surrounded by those marvels of science and mechanics which have been reduced to mass production that he really has little idea of the creative toolmaking challenges involved in the making of those dishwashers, diesels, thermostats and outboard motors which he accepts as part of the American scene.

It is perfectly understandable that a boy with certain aptitudes, manual dexterity and pride in craftsmanship chooses to be a dentist. Ever since childhood he has known about dentistry; he was either fascinated by the profession or afraid of it.

Suppose, during his last one or two high school years, you had taken that boy through your toolroom, explained and demonstrated to him the jig-borers, duplicators, dividing heads and measuring tools which respond so sensitively and precisely to the touch of the skilled user.

There is a fighting chance that given such an experience the boy would never let go of it; we would lose a good dentist and gain a good toolmaker.

Next month, TOOLING and PRODUCTION will have several pages devoted to what two of our largest industrial employers are doing in the way of (a) training apprentices, and (b) choosing apprentices for future supervisory positions. These stories would be eye-openers to any youngsters who are in danger of becoming square pegs in round holes, or who can't think in terms of toolmaking because they don't know what toolmaking is.

Can we persuade each one of you who reads this, to clip those pages next month and pass them on to a neighborhood boy? If, collectively, you could interest only 50 boys in entering toolmaking training it would be a good month's work.

E. Willard Pennington

Publisher

# How to Design and Build Plastic Tooling for Press Production

As the offspring of an emergency search for replacement processes, plastic tooling might have been one of the thousands of stop-gap measures that were dropped as soon as the war was over—because of inordinate cost and limited, specialized application. But the plastic tool, bringing economy as well as production speed with it, has been hardy and the reasons are rather interesting.

For the past six years, the use of the plastic material for stretch press dies has continued in the aircraft industry where it was first adopted, and has expanded to include other industries that could hardly have been expected to show an interest.

*by* **A. E. Noble**
*Technical Engineer*
*Catalin Corporation of America*
*New York, N. Y.*

When first conceived, the plastic tool, along with wooden and high density plaster tools, was intended for forming light gauge sheet metals in experimental aircraft production where steel dies were impossible to use because of the time and cost involved in their preparation. Phenolic plastic tooling became the standard tooling method for this phase of the industry. Gradually, as tooling engineers became aware of its possibilities, use of the material was extended to a wide variety of tooling applications.

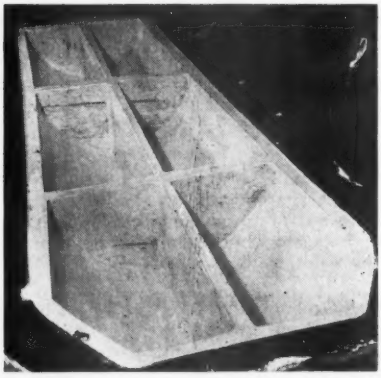


**Fig. 1. Die made with movable cores. View with mounting side uppermost.**

**Fig. 2. Placing poured mold in oven for final curing.**

By the end of the war plastic tools were being used in the forming of acrylic sheet for aircraft canopies and turret windows. They were applied to the production forming of aluminum sheet where recurrent tooling changes were required by combat-dictated modifications. And they had utility in other important phases of tooling, such as spinning chucks, Keller patterns, checking fixtures, tube bending mandrels, drill jigs, and even welding jigs.

Because the aircraft industry familiarized itself with plastic tooling it reaped the benefits of its many applications. Other manufacturing operations involving sheet forming and production fixtures did not readily take up plastic tooling. The shops that developed facilities for casting their own plastic tools applied the process profitably. The question of whether plastic tooling could return its initial investment in small scale operations is answered by the acceptance of it in the foundry industry where it is now being used for mounted match plate patterns. Since general awareness of the method has spread, plastic tooling processes have appeared

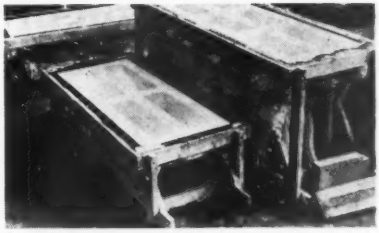


Fig. 3. Plastic tool shop.

in several major industries. In many cases they have brought about reductions in cost and time.

The plastic from which the tools are made starts as a liquid product of the chemical combination of phenol and formaldehyde similar to that used in the manufacture of cast phenolics. It is a thermosetting or heat-hardening plastic, in a class opposite to the thermoplastic or heat-softening plastics, such as injection molding compounds, polystyrene or acetate. Once hardened into a cast shape the material cannot be re-converted to a liquid by the application of heat. This characteristic renders the material more stable and thus more suitable for tooling. It is exceptionally resistant to dimensional variation, expanding and contracting with varying temperatures to only a slight degree.

The process of hardening is carried out by the application of heat from an external source such as an oven, and by internally generated heat. The latter is promoted in some types by an accelerator. This accelerated resin is generally preferred in tooling operations because it can be readily cured in the shop of the tool-maker. Un-accelerated resins require more specialized facilities and are often handled by the manufacturer in his plant. For our discussion here, let us specify one particular resin*, a three-component accelerated tooling resin that contains a stabilizing agent as well as an accelerator.

Fig. 4. Plastic mold with cores. Treated ready for pouring.

Catalin 9585 Tooling Resin manufactured by Catalin Corp. of America.

A description of the plastic tooling method follows, for the purpose of acquainting tool users with its basic requirements. We have maintained a general approach for two reasons. Detailed explanation of all factors should be reserved for the time when a tool-maker can offer his specific problems as the basis for discussion. Individual needs and conditions vary so widely that no positive procedure or data can be stated here.

Fig. 5. Finishing plastic checking fixture.

Fundamentally, plastic tooling is a simple process. It has two phases: The mechanical, which is concerned with making the master pattern and the mold; and the chemical, which involves mixing and curing the resin.

The mechanical parts of the operation follow a simple scheme, but require careful workmanship. Their starting point, of course, is on the drafting board where the design is laid out. From the blueprint they proceed to the pattern shop. Templates are laid out according to the appropriate scale.

The master pattern is formed with

*(continued on page 104)*

# Specification and Application of Automotive Drawing Compounds

*by* **James T. O'Reilly**
*Manufacturing Research Department*
*Ford Motor Company*

### Function

In this brief outline of specification and application practices in the industry, drawing compounds are defined as lubricants to facilitate the forming of metal. Emphasis will be on press forming operations on low carbon steel, since this constitutes the biggest production volume in the industry and on practice, rather than theory, since formulation and theoretical data will be stressed in a companion paper on this program.

There are usually two conditions that distinguish drawing lubricants from lubricants generally — extremely high unit pressure and relatively slow speed slippage of one metal surface on another.

In some fields of lubrication, such as, turbine bearings, it is possible to provide a lubricant film of such thickness that the laws of hydraulics apply and wear is negligible. However, with high pressure drawing applications, most lubricants tend to be squeezed out, leaving only very thin films that are absorbed on the metal surfaces by chemical or physical forces. This condition is called "boundary lubrication".

Drawing lubrication is to control friction, which, according to latest theories, is caused by momentary welding of the contacting molecules of the surfaces sliding against each other. These welds, which involve an extremely low percentage of the total surface molecules, are alternately broken by shear forces and reformed with a new set of molecules to give "slip-stick" motion, which is so rapid that it is not ordinarily discernible. Besides reducing friction with a corresponding decrease in power consumption, drawing compounds minimize breaking of sheet stock and die wear.

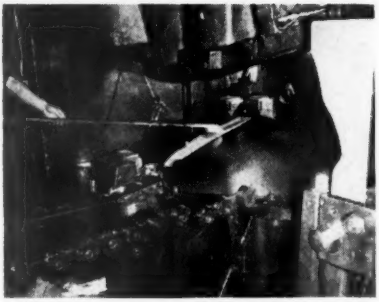


**Fig. 1. Automatic spraying is here supplemented by spot brush application.**

### Methods of Evaluation

The trend in materials specifications, generally, is towards performance requirements correlating with production conditions, rather than a required chemical analysis. We would like to be able to tell a supplier, "You can supply green cheese to this specification, if it possesses the performance requirements therein". We would like also to develop laboratory test requirements, meeting of which would insure satisfactory production performance.

This objective has been approached with some materials and one reading the glowing reports available in the literature on laboratory machines for measuring the coefficient of friction, film strength, etc., would certainly gather that it must certainly be true of drawing compounds.

The best indication of the automobile industry's regard for these testers is the fact (disconcerting to a specifications engineer) that most automobile manufacturers don't have any drawing compound specification at all, but depend entirely upon shop trials.

This is unfortunate because, although the final proof of the pudding is generally acknowledged to be in the eating,

**This feature article by James T. O'Reilly was first presented as a talk before the AMERICAN SOCIETY OF LUBRICATION ENGINEERS' Sixth Annual Convention in Philadelphia last April. Because of its timeliness and importance to TOOLING and PRODUCTION readers engaged in the stamping and drawing of military components, we are very grateful to the Society for permitting prepublication in TOOLING and PRODUCTION prior to publication in the ASLE's own Journal, LUBRICATION ENGINEERING.**

anyone who has delved into shop trials generally realizes their limitations. There are more production variables than the average production superintendent appreciates. Foremen are not very tolerant towards thorough shop trials that can interfere with production rates, no matter how promising the ultimate goal.

When a new compound is being tested, the supplier's service engineer often assists and much good can come from this practice. However, one must remember the service man is also a salesman—his primary purpose is, naturally, to see that his product shows up to best advantage, and quite often the hard pressed production foreman is not thorough enough to see that the standard material being used as a control is used correctly.

Since shop trials are so vital, if we can't take the shop into the laboratory, we can try to take the laboratory into the shop by assigning sufficient competent engineering-minded personnel to the job and following definite test procedures. Practice varies in the industry, with shop trials being the responsbility of the quality control laboratory (as is generally the case at Ford's), master mechanic, plant engineer, production superintendent, tool stores department, or tool and die engineer.

Since tools on a given job have been

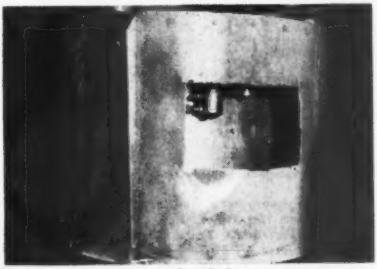


Fig. 2. Spray gun (hooded to prevent overspray) spot applies compound to hood blanks.

Fig. 3. Rear axle housing tubes after dip applying soap Borax drawing compound coating.

adjusted (draw ring, tension etc.) for optimum results with the regular drawing compound, further tool adjustments may be necessary when trying a different type of compound. Care should be taken that surface smoothness and other properties of the stock and tools are the same for comparative tests. Application and dilution, if any, should be duplicated. Definite standards of performance are necessary, such as per cent of scrap, pieces produced prior to scratches that can be felt by the fingernail, and pieces produced between reworking of tools. Figures based on an average of two or three production runs, including a re-run of the material used as a control, are desirable.

We have found it advantageous to use a touch pyrometer to check the metal temperature of a part in a critical area immediately after removal from the press. Temperatures 10°F. above normal often indicate trouble ahead.

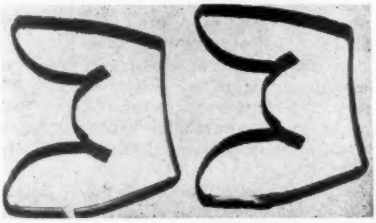
*(continued on page 88)*

# How to Use Low-Melting Filler Metals in Die Construction and Repair

With mounting shortages of critical materials, and a dire need for more and more tools of production, the salvage of such tools and dies broken through mishap or carelessness has assumed renewed significance. The procedures are, of course, not new, having been introduced and widely used during World War II, at a time when extended shutdowns to await replacement were just as costly and unforgiveable as they are now.

In the welding of tools and dies, the electric arc process and the torch welding process are almost interchangeable, and both can be used to advantage. If anything, the electric arc process has a slight edge over gas welding, in that the heat is more localized, which merits consideration when overlaying chipped, worn, or missing sections, and the heat-treatment of the tool or die is not to be disturbed too severely. In most other cases, however, the choice of application is either up to the operator or depends strictly on the available equipment.

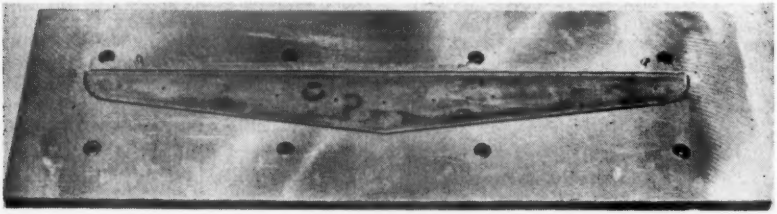
*by* **R. H. Groman**
*Regional Manager*
*Eutectic Welding Alloys Corporation*
*Flushing, New York*



*Arc welding saved this shoe die. Broken edges were first beveled to approximately 45°, and the die clamped to a carbon block. The latter step permits starting the arc on the carbon, rather than on the thin, delicate edge of the die, thus avoiding the danger of burn-through. EutecTrode 68 was used to build up the die to within 5/16" of the cutting edge. EutecTrode 6HSS being used for the edge itself. Each bead was peened lightly, and upon completion of all welding, the repaired area was tempered to a light straw color.*

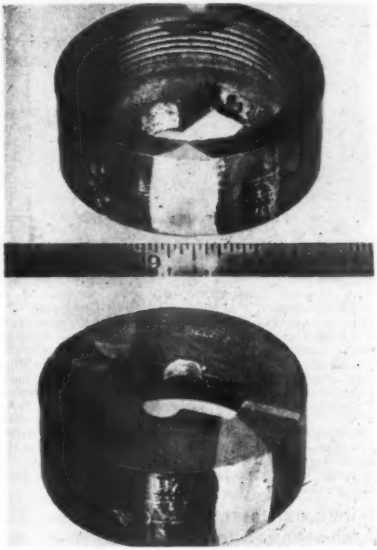
Generally speaking, there are four categories into which any and all tool welding may be classified:

**(1) Tool and Die Repair**
**(2) Composite Die Construction**
**(3) Correcting Design**
**(4) Correcting Errors**



*After forming thousands of pieces, the die shown began to wear very badly and finally cracked at the corners. The die was repaired in this manner: First the worn and cracked areas were completely gouged out with CutTrode, oxygenless cutting electrode. They were then welded up with ⅛" EutecTrode 68, first from the top of the die, then from the bottom. Final passes in the working area were made with EutecTrode 6HSS for optimum hardness and abrasion resistance. More than 7000 pieces had already been formed when this photo was taken, and yet no signs of wear are discernible.*

*This broken "adjustable die head" was salvaged with EutecRod 14FC. Edges were ground to a vee at the break, aligned and clamped together, then welded. Since fusion of the base metal was not required, warpage and distortion of the die head were kept to a minimum, and permitted it to operate "as good as new" after the completed repair.*



**Tool and Die Repair**

To begin with, Tool and Die Repair includes both building up of worn surfaces as well as the reclamation of broken or cracked units. When a steel die is damaged, the depth of crack is the prime consideration; obviously, if it is a simple die, such as a shear die, which has a very deep fracture, welding is hardly worthwhile. On the other hand, if it is only a very shallow crack, or perhaps only a chipped edge, welding very decidedly is more economical than scrapping and replacing the die.

Next in importance are the physical properties and composition of the base metal. The electrode or welding rod to be used should, of course, match these properties as closely as possible, so that the repaired unit will perform as well, if not better, than the original. This is of special importance when the die has to be heat-treated after welding.

If, for the moment, we disregard high speed steel, which is principally used for cutting tools, such as milling cutters, reamers, broaches, taps, drills, and lathe or planer bits, then tool and die steels fall into four basic classifications:

**Oil Hardening**
**Air Hardening**
**Water Hardening**
**Hot Working**

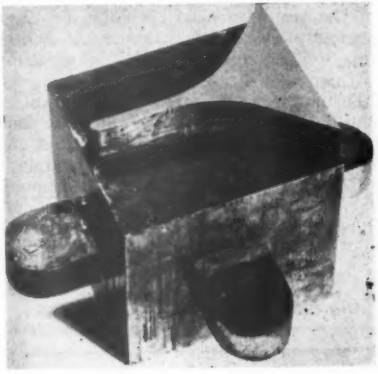
**Determining Type.** If it is not known which type of steel was used in the die, such factors as these will help to determine the proper electrode to use in repairing it:

1. What type of die, i.e. forming, forging, hot trimming, piercing, etc.?
2. What is the Brinell or Rockwell hardness of the die?
3. From what temperature was the die quenched? In which medium?
4. What was the tempering range?
5. How long was the die in service before it failed?

The last question will not help much in determining the type of steel that was

*(continued on page 72)*

*When the wrong springs were inserted into the punch and die set, of which the punch is shown in the photo, portions of the die broke out and caused the entire tip of the punch to crack off. Damaged section was built up almost entirely out of EutecTrode 68, then finished off with several layers of EutecTrode 6HSS to impart the requisite hardness and toughness to the die. Thousands of pieces had already been punched when the photo was taken.*



# The Design and Manufacture of a 9-ton Lamination Die

The two giant water wheel generators to be built for the Hoover Dam hydro-electric project were hardly enough to justify an "assembly line" setup, but certain components were required in such large numbers that high-production tools were essential. For example, 26,000 rotor rim laminations were needed, with each piece to be perfectly reversible and interchangeable in order to speed the assembly operations.

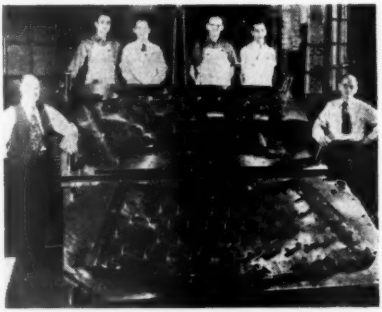
These requirements pointed the way to the design and manufacture of a rotor rim lamination die, the largest ever produced by Allis-Chalmers. Designed and entirely built in the company's shops, this die measures 100" long by 52" wide with a shut height of 19¼". It weighs about nine tons and requires a press having a capacity of 700 to 800 tons. Despite the eye-catching size of the die, however, accuracy is the prime requisite if the magnetic flux path is not to be unduly impeded.

Since accuracy is so critical, every detail is indicated on the drawings before the job is submitted to a crew of skilled diemakers. The first step taken by this crew is the preparation of a template.

### The Template

The template is made of sheet steel plate 50" by 42" by ⅛" thick, which is bored on a boring mill to an inside diameter of 202.3950 inches. Only one-half of the template need be made, for it is perfectly symmetrical about its center line (which further adds to economy without sacrificing quality on the job). All holes are jig bored in the template and in a 1" steel plate which is used only for checking. Holes are located and bored to a tolerance of plus or minus .0005" of their true position. Guide holes serve as markers for scribing the outline of the template, with the outline falling tangential to these holes. The template is sawed from a ⅛" sheet and is filed to size very carefully since it will later serve to locate the tool steel sections on the punch and die plates. (For clarification, consider the plates bolted to the punch holder as punch plates and the plates bolted to the die shot as die plates.)

*by* **Harry Urban**
*Tool Design Engineer*
*Allis-Chalmers Manufacturing Company*
*Milwaukee, Wisconsin.*

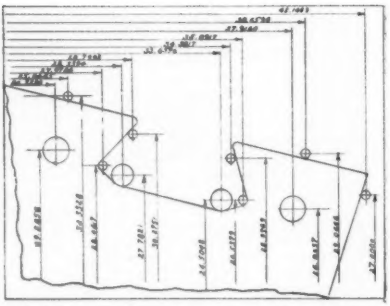


*The largest lamination die ever produced at Allis-Chalmers Manufacturing Company is shown with its designer Harry Urban (extreme left) of the company's tool engineering department, and (left to right) Diemakers Donald Mantsch, Harold C. Yogerst, Armold Behling and Harold Anderson, and Toolroom Foreman August Severson. The four diemakers worked a combined total of over 2,000 hours to complete the job. The die will be used to punch out rotor rim laminations for two water wheel generators being built for Hoover Dam. The die is 100" wide, 52" deep and 19¼" high. It weighs nine tons and requires a 700 to 800 ton press.*

### Punches and Dies

The tool steel used in this die is high chrome-high carbon, totaling 1100 lbs. The bars range in size from 2" by 2" to 2" by 3½" and are planed in bar length removing .040" on all sides. The bars are cut to size and contour shaped, leaving .005" to .010" for final grinding. The sections thus formed are drilled and tapped for ½" screws and taper reamed for #7 taper dowels.

After drilling, tapping and reaming are complete, the sections are hardened with a maximum temperature of 1750F and double tempered at 700-725F with a Rockwell "C" hardness of 61-63. With



*A small section of the template that was made for locating the tool steel sections in the punch and die plates. The template was made to represent only one-half of the die because the design is perfectly symmetrical about its center line. All holes are jig bored in the template, and guide holes serve as markers for scribing the template outline, the outline falling either tangential to the guide holes or conforming to the periphery of the holes in cases of corner radii as shown.*

hardening and tempering completed, the sections are finished ground top and bottom on a surface grinder.

Piercing punches are turned to within .010" of size, finish ground, and drilled and tapped in the shank end for securing to the mounting plate. Finish ground pieces make a light press fit in the punch plates.

### Punch and Die Plates

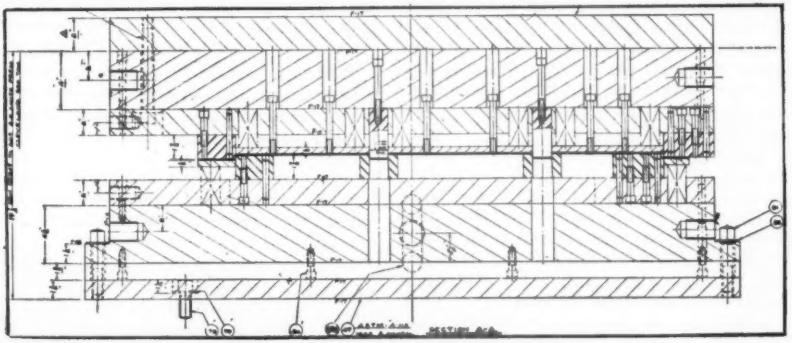
Because of the large size of the die and to facilitate handling, steel plates for mounting both punch and die sections were used. These plates were made in halves, each section being 50" long, 48" wide, and finish ground (top and bottom) to 2" thickness after annealing. The punch plate halves are jig bored for locating the pierce punches.

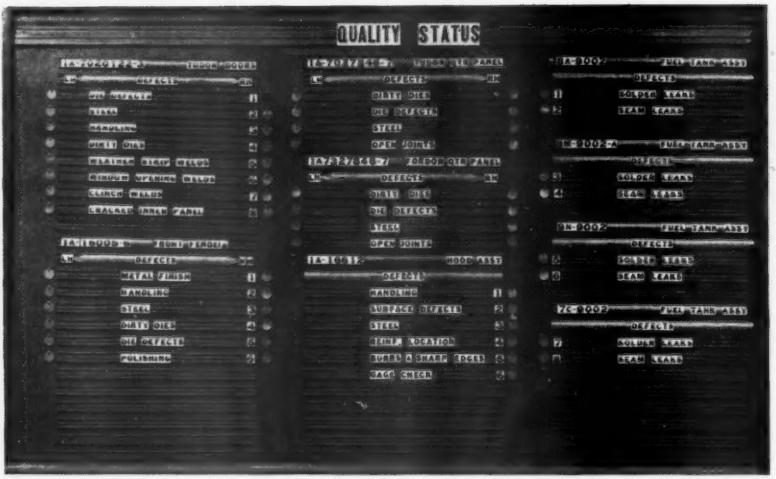
Eight of the pierce punches are put in place in each of the punch plates in a staggered fashion and the template is placed over the punches. The die sections, previously hardened, tempered and ground, are put in place and each is finish ground to fit the template. When they are finally located, all the screw holes are transferred to the punch plates and the die sections are screwed in place.

After a double check has been made by reversing the template, the taper dowel pin holes are drilled and reamed in the punch plates. Each taper pin is individually fitted by trial so that the pin will have full bearing in the punch

*(continued on page 58)*

*The finished die was mounted on riser strips and plates of 1¾" thickness, screwed to the die shoe. This permits an accumulation of slugs from fourteen punchings before the scrap has to be removed. The clearance holes provided in risers, die shoe and punch holder for all stripper bolts make it possible to remove stripper and shredder plates in order to replace broken springs without removing die and punch plates. The pierce punches are replaced through clearance holes provided in the punch holder. Lift holes are drilled in all plates, die shoe and punch holder.*






*A Quality Status Board, maintained in the office of the Quality Control Manager, shows at a glance the quality status of every major part by means of colored discs hanging on hooks adjacent to each part listed. A green disc shows that the stamping operation is producing satisfactorily, according to the inspector's hourly samples. When and if the operation does not produce to specifications, a red disc is posted and corrective measures are started.*

# Press Tool Maintenance and Quality Control

At the Dearborn Stamping Plant of the Ford Motor Company, as in other plants of the company, we try to build top quality into our products by establishing quality controls and encouraging quality workmanship with every means at our command. We seek to control the basic material, control the process, encourage workers to put forth their best efforts toward quality, and improve our handling techniques.

Inspection and maintenance of press tools is an important part of the quality control program. So is Statistical Quality Control. As a matter of fact, the two are closely related and integrated, because without Statistical Quality Control, proper preventive maintenance would be much more difficult.

Perhaps it is unnecessary to point out that the application of Statistical Quality Control to metal stampings differs greatly from its application in machining operations in other plants of the company. With machining operations, often the changing or sharpening of a tool is all that is needed to make an improvement in the part. This operation requires very little time or expense.

With a metal stamping operation, however, the changing of a die, resurfacing of a die or replacing of a die section often requires a great deal of time, and cannot be done at a moment's notice. In our plant, for example, where stampings of fenders, doors, roof tops, quarter panels, and other automobile parts are

*by* **Fred E. Fisher**
*Senior Analyst*
*Dearborn Stamping Plant*
*Ford Motor Company*

*After the first forming or draw operation, the inspector takes one panel at random every hour. A hand operation of stoning or rubbing with a flat emery stone, "high lights" or brings out die marks or other defects which ordinarily would not show up until the car was painted. The defects are recorded on a tally sheet and later are plotted on the control chart.*

concerned, die correction often involves many hours of work and must be planned and properly scheduled in order to avert disruption of production cycles.

In order to correlate the problem of quality with production and other problems affecting the entire plant, a Quality Committee was established in the Dearborn Stamping Plant some time ago. This committee consists of Manufacturing Department heads, Production Control supervision, Tool and Die Department general foremen, Welding Maintenance general foremen, Inspection representatives, Material Handling supervision, and the Administrative Coordinator.

The committee's authority is broad because its problems are broad. Perhaps it should be mentioned here that the Stamping Plant contains 46 acres of floor space. At times, it has shipped out as many as 250 box cars of stampings in a 24 hour period. As you can imagine, any problem, when looked at from an overall standpoint in a plant this large, takes on sizable proportions.

The committee learned early, however, that dwelling on the magnitude of the overall quality problem accomplished little in itself. Only by breaking the probem down into a multitude of individual problems and taking care of them one at a time, was the desired result achieved. Generalities are avoided in the committee meetings so that specific planning can be accomplished.

This committee, however, cannot function effectively without evidence that a quality problem exists. Where does it get this evidence? Here is where one of the prime functions of Statistical Quality Control comes in.

The quality picture on critical production jobs is presented to the committee in chart form, and the need for corrective action is clearly indicated. If die work is involved in making the correction, the Die Service Department is called upon and given proper instructions. If the source of trouble is other than tool and die the appropriate maintenance departments are called in.

With the assistance of Production Control and Production Supervision, cutoff dates are established right at the meeting, together with the quantities of parts that must be built ahead of cutoff dates to maintain production line schedules. The necessary time required for tool maintenance is decided upon, the time that the tool will be turned over to the maintenance men is established; plans are finalized at the meeting.

The Inspection Department is given the responsibility of checking the results of the repair work to determine the amount of improvement that has been made. In cases where the part has come close to exceeding the control limits, the Inspection Department of Quality Control must give an OK on the first stampings before production can continue.

In any thoughtfully conceived quality control program, quality must start with the basic product—and that means with the raw material. For this reason, a great deal of emphasis at the Dearborn Stamping Plant is placed on making sure that the basic material we work with—steel—is right for the job.

The responsibility for checking this important point is upon the Quality Control Laboratory within the plant. Samples are taken from the coils or lifts

*(continued on page 60)*

. . . Lamination Die, from page 55

plates. (This is done by filing the pins in a speed lathe and requires only about two minutes a pin.)

Both punch plates are then clamped in position on a large surface plate and work is started on the die plate. Spacer blocks are placed on the punch plates around the inside of the die sections, and punch sections corresponding to the die are set on them. Punch sections enter the die sections ½" with their cutting edges while resting on the spacer blocks, and .003" shim stock is inserted between edges to insure proper clearance for cutting, the sections being ground until they fit.

The template is now used for scribing contour lines and pierce holes on the two parts of the die plate. Using the scribe lines as guides, all punch sections and pierce die blocks are placed in their proper positions on the die plates. All screw holes and slug holes are transferred to the die plates. Again, all punch sections are located within the die sections on the punch plate and the .033" shim stock is inserted for proper clearance.

Pierce die blocks which have been finish ground are placed over pierce punches, using .003" shim strips for centering. All sections are then rigidly braced by wedging pieces of hardwood between the pierce die blocks and the outer punch sections. The die plates, with all screw holes drilled and counterbored, are placed over the punch sections and all screws drawn tight. The two die plates are removed from the die and all taper dowel holes are drilled and taper reamed, using the same method as with the punch plate and die sections.

### Stripper and Shedder

Scrap is stripped from the punch by a stripper made from two ½" steel plates which are actuated by forty-four 1½" diameter medium deflection springs. Spring pockets and stripper bolt holes are drilled in the die plates. The stripper, made in halves, is sawed from steel plate to a scribe line made from the template.

Blanks are shed from the die by a shedder also made in halves from ½" steel plate. Again, this is cut from plate to a scribed line from the template. The shedder is actuated by one hundred 1½" diameter medium deflection springs, and the pockets for these springs and the holes for the stripper bolts (which limit the travel of the stripper to 1/32" above the face of the die) are drilled in the punch plates.

Provisions for the accumulation and removal of punching slugs are made by mounting the finished die on riser plates and strips planed from 2" stock to a thickness of 1¾". This allows 14 punchings to be made before slugs must be removed. The riser plates are attached to the die shoe with screws.

Clearance holes are provided in risers, die shoe and punch holder for all stripper bolts, making it possible to remove stripper and shedder plates to replace broken springs without removing die and punch plates. Clearance holes are also provided in the punch holder for removing pierce punches, and lift holes are drilled in all plates, die shoe and punch holder.

Gradual engagement of the punches is assured by grinding a very small angle on their faces so that the high point is toward the center of the die. This angle is calculated to give a shear equal to two thicknesses of the blank stock.

### Performance

After the setup for the initial run, trials showed that no adjustments were required. The blanks were completely burr-free. Checks made after 3000 and 7500 punchings (of the order for 26,000) showed that no burrs had developed.

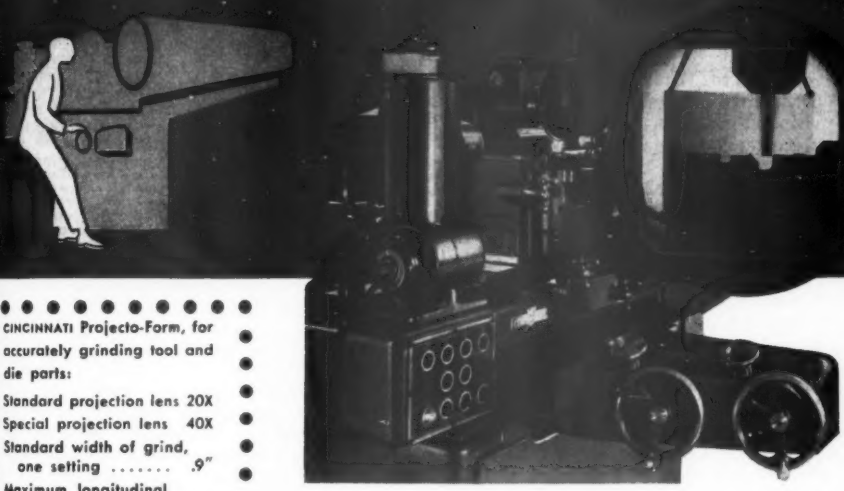
Four skilled diemakers worked over 2000 man-hours under the guidance of the designer and a tool room foreman to complete this tool, but its trouble-free performance has proved the time and money well spent.

★ ★ ★

**Eutectic Welding Alloys Corporation** has constructed a new, modern administration building at 40-40 172nd St., Flushing, N. Y. to consolidate and house existing branches of the company scattered in and about the New York metropolitan area, including the general and executive offices, and the new Eutectic Welding Institute. The structure covers an acre in the Auburndale section of Flushing adjoining the larger manufacturing plant erected by Eutectic last year.

# PROJECTO-FORM

*Gives you a ringside seat of accuracy in the making*



CINCINNATI Projecto-Form, for accurately grinding tool and die parts:

Standard projection lens 20X
Special projection lens 40X
Standard width of grind, one setting ..... .9"
Maximum longitudinal adjustment ..... 4½"
Complete specifications in catalog M-1612

Like television, CINCINNATI Projecto-Form Grinding Machines eliminate a lot of intermediate steps and show you exactly what's happening at the point of action. Through an arrangement of lenses and a mirror, an intense light projects a silhouette of the work and wheel to a ground glass screen in front of which the operator is seated. A "drawing" of the desired contour, twenty times size, is cut on a glass plate coated with a tinted translucent emulsion. Mounted on the viewing screen, the drawing furnishes a guide to which the operator works. With two micrometer adjusting handwheels, he adjusts the wheel vertically and transversely while it reciprocates over the work. Grinding continues until the image of the work matches the drawing. You may obtain complete specifications by writing for catalog M-1612.

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. . . Press Tool Maintenance, from page 57

of steel. The data collected are analyzed as to draw performance and surface conditions existing in the steel. All steel received is checked as it is used in manufacturing operations. If found defective, it is rejected in the coil or lift for substitution on other parts and/or for replacement.

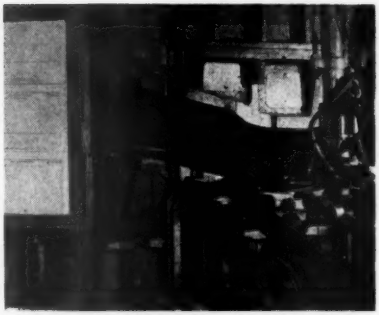
The data as collected by the laboratory on steel performance are compiled and reported to Purchasing, steel vendors, production supervision and plant supervision. Statistical Quality Control charts are often used in presenting this information.

Since maintenance of press tools is based to a large extent on our check of the parts they produce, it follows that inspection occupies a prominent place in our quality program.

The semi-finished part or the preassembled part is checked after it has gone through the first forming or draw operation. The inspector takes one panel at random from this operation every hour. To determine whether there are any defective areas on the panel, it is "stoned" or rubbed with a flat emery stone. The stoning process, which is done by hand, brings out "high light" defects that are not visible in the panel in the "white form." They ordinarily would not show up until the car was painted. The number of defects or high lights are recorded on a tally sheet, and later are plotted on the control chart.

The stoning process also shows up die marks that need to be corrected. These marks are caused by the accumulation of foreign particles in the die, such as dirt or steel particles. Sometimes they are caused by the fact that the die is "washing out" or wearing out in a certain spot. These defects also are plotted on the control chart.

The information gained by the inspector through the stoning process is turned over to the Analysis Section in order that control limits for the charts may be computed. A recapitulation of the information is made, as well as a daily trend chart to show the day-by-day progress of the quality of the part or the condition of the die.



*At each press a tally sheet is used for posting the performance findings of the inspectors' hourly sampling. This information is taken by the Analysis Section to compute limits for the control charts. The "Iron Hand" that automatically unloads this press is indicative of Ford Motor Company's extensive "automation" program.*

This information is presented to the Quality Committee, and forms the basis of whatever corrective action may be necessary for the preservation of quality.

I do not mean to imply that no corrective measures are put into action without the express direction of the Quality Committee. In many cases that would certainly work to the disadvantage of quality production. When trouble is spotted, immediate steps are taken to determine the cause, and if it can be remedied without great difficulty or loss of time, the correction is made without Committee action.

As a matter of fact, the plant has a very effective system for immediately notifying those in authority when any operation begins to go out of control. In the office of the Quality Control Manager hangs a Quality Status Board, on which every major part made in the plant is listed. Before each part name is a hook, and on this hook hangs a colored disc. If the stamping operation is producing parts satisfactorily, according to the hourly samples checked by the inspector, a green disc hangs on the hook. If the operation is not producing satisfactory parts, a red disc is hung on the hook. Thus at a glance the Quality Control Manager or any other interested person can tell the quality status of every major part.

*(continued on page 101)*

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# Coil Cradle Methods for Feeding High Production Presses

Mechanization of smaller metal stamping operations has proved so successful that several producers of pressed metal articles are now extending the use of automatic feeding devices to include their largest operations. This opens up a field for new and heavier coil handling equipment since few cradles now in use will handle the tremendous weights of metal involved in the larger coils.

To keep pace with this trend, steel mills have gradually developed continuous strip mill capacity. Now there are

*by* **George Amrhein**
*Senior Design Engineer*
*E. W. Bliss Co., Toledo, Ohio*

three steel plants equipped to produce 90-inch strip continuously and 72-inch width capacity is not at all uncommon. Mills have also stepped up the weight of coils, which is usually based on so many pounds per inch width of coil. Some years ago a weight of 200 lb./in. was the heaviest handled, but today 300 lb./in. is common and mills are pushing 500 lb./in. coils. In the narrow coils, some customers are already using 1000 lb./in. coils. The ultimate coil weight predicted by steel producers will be approximately 70,000 pounds and this figure is the basis for future designing of cradles and other handling gear.

### Coil Stock More Economical

There is an aspect of economics in the use of coil stock that should be understood. The major item, of course, is the saving in cost if material is purchased in the form of coil stock. Storage problems are simplified as no pallets or spacing timber are required. When sheet steel stock is purchased cut to size and shipped in stacks there is a liability of edge damage which may require hand straightening or, in some instances, the scrapping of the particular sheet. However, injuries to the edge of coil stock would, in most instances, be corrected when passed through the straightener (Fig. 5).

When a product, by its shape or size, is subject to slow handling in the forming or drawing operations, it is well to consider having blanks furnished from a separate blanking group consisting of a cradle, straightener and press. As the blanks can be produced at a much faster rate than the following operations, the blanking group can supply two or more

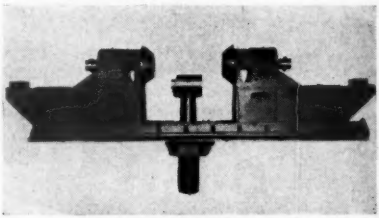


**Fig. 2. A double stub arbor, or cone type payoff. This type of reel grips the coil from each side. It is used generally on heavy coils where they are fed to the cradle from a ramp or by a crane.**

**Fig. 1. The expanding mandrel type payoff reel. This type reel is used for the heaviest coils since there is no tendency to mark stock as in a cradle type payoff. Mandrel payoff reels have been used for years in conjunction with rolling mills.**

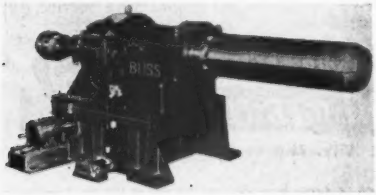
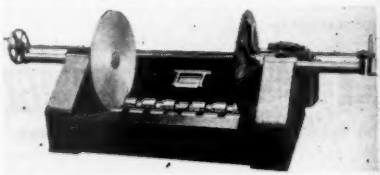
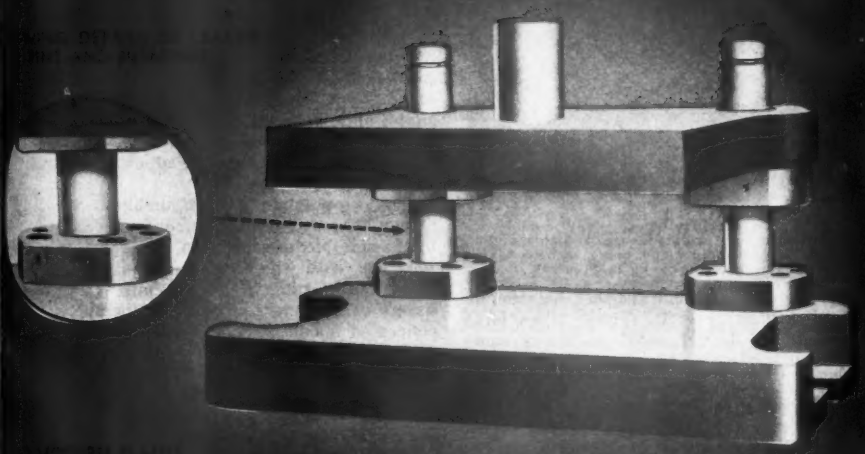



**Fig. 3. A modern, heavy duty coil cradle. This cradle is fed from a ramp over the low entrance side. Payoff is over the high side. Rolls are faced with special high-friction cast iron.**



# NO OTHER DIE SETS LIKE



E. A. BAUMBACH MFG. CO...

lines of forming or drawing presses.

### Problems in Handling Large Coils

There are two approaches to the problems of constructing a machine to unwind stock from a coil. It can be loaded on an arbor, either an expanding single

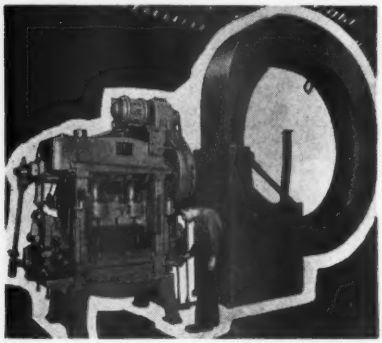


**Fig. 4. To conserve space many cradles are fitted with loop feeding devices which maintain slack between cradle and press without taking up valuable floor space, as in Figure 5.**

overhanging arbor (Fig. 1) or double stub arbors (Fig. 2). These types have been used in the steel mills for some years.

The other type is a machine which cradles the coil on two or more support rolls, such as Fig. 3 whose peripheral speed is the same at all times as the surface speed of the coil which gives a constant pay-off of material.

A coil cradle, also known as an uncoiler, coil box, dewinder or pay-off reel, is essentially a piece of equipment that provides a roller support for the coil. This roller support is power driven, either mechanically or hydraulically, to unwind stock from the roll at various speeds. The coil of stock is confined at the sides by either stationary or rotating guide plates with manual or power adjustment. The stock as it unwinds from the coil is allowed to pay off into a loop and a loop control is necessary to keep this loop within the proper limits. No means of elevating the coil is needed.

Basic in the design of the modern large capacity coil cradle such as illustrated in Fig. 3, is a rugged frame with rigid box-type side sections which are spaced and joined together with a stiff four-web beam structure to insure positive alignment of support rolls. Into this frame is set the support roll bearings. In the wider sizes of cradles, the center bearing is of the bronze sleeve type. These bearings support a heavy roll shaft. On these shafts are placed the round cast iron sleeves that actually contact and rotate the coil.

The use of cast iron for these driving sleeves was arrived at by eliminating such other materials as rubber, bakelite, wood, etc. which did not give results warranted by their higher costs. The cast iron used for this purpose is a special iron with most of its carbon in the combined form and little present in the shape of graphite flakes. No serrations of any kind are used on these sleeves as the tendency to mark the stock is objectionable.

The supporting roll assemblies are driven by gearing which is confined within the side box sections and this gearing, together with the double strand main drive chain, runs in an oil bath. This design of drive with all driving members concealed inside the box sections results in a clean appearance of the cradle. Large removable plates allow accessibility to parts inside the box section and through the use of special oversize bearing cartridges, make possible the removal of the cast iron sleeves or the shaft itself through the side of the frame.

*(continued on page 149)*

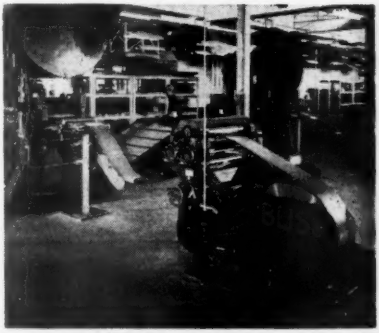
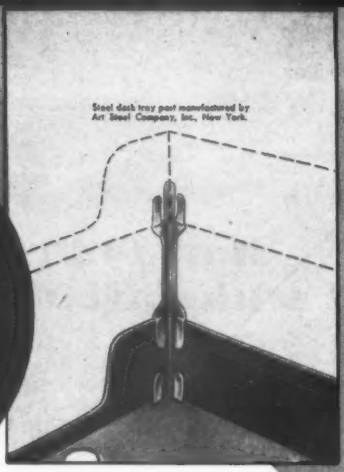


**Fig. 5. A moderate sized Bliss cradle with stock straightener, feeding a Bliss high production press.**

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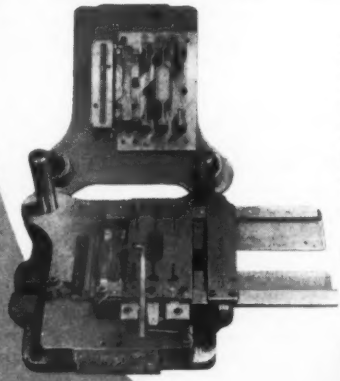

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# How to Drill Cast Iron with Carbide Twist Drills

*by* **Fred. W. Lucht**
*Carboloy Co., Inc.*
*Detroit, Mich.*

Actual production application over extended periods of time, following comprehensive laboratory tests, have now clearly demonstrated that cemented carbide twist drills can drill holes in cast iron at least twice as fast as high speed steel drills. At these higher speeds, drill life is roughly three to four times that of steel drills.

In addition, carbide drills can be used to advantage even where increased speeds are not possible, because, operating at the same speeds, they give a tool life around 10 times that of high speed steel drills.

A typical carbide-tipped twist drill such as was used in the laboratory tests and also used in routine production applications is shown in Figure 1. The drill is made simply by inserting a standard carbide twist drill tip, grade 44-A (Figure 2), in the end of a conventional high speed steel twist drill.

With this type of drill, consistently uniform results are now being obtained, using the same drilling equipment as was formerly used with high speed drills. Precautions to be taken, as far as machine and fixture condition is concerned, do not differ from good practice for high speed steel drilling. Prime requirement —if it is desired to take advantage of the increased drilling speeds and feeds made possible by carbides—would be that the drilling equipment simply have enough power to take care of the increased rate of chip removal.

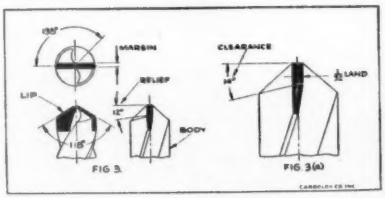
### The Drill

Excellent results have been obtained by one of the leading twist drill manufacturers by brazing the tips to the end of regular high speed steel twist drill bodies as one of their regular manufacturing operations. The conventional 118° point angle is ground on the end of the drill at a 12° lip relief angle as shown in Figure 3 by using a 180-grit resinoid bond diamond cup wheel. It is advisable to first remove both the excess steel and carbide with a silicon carbide wheel by grinding a 14° clearance angle up to a 1/32" wide land as shown in Figure 3(a). Longest drill life is obtained when the cutting edges along the drill lip are smooth and keen and without blemishes. Length of the drill lips should be identical. To facilitate a free flow of chips, drill flutes should be polished.

Such drills have been produced both by carbide tool manufacturers and by tool users who have the necessary but simple brazing and grinding facilities. In the latter case, the users have been purchasing conventional high speed drills and then tipping these with carbide before putting them into service.

A silver brazing alloy such as Easy-Flo #3 is used as the brazing material,

**Fig. 3. The recommended angles for a carbide-tipped steel drill. To facilitate chip flow, the flutes should be polished. For accurate work, lip lengths should be equal.**



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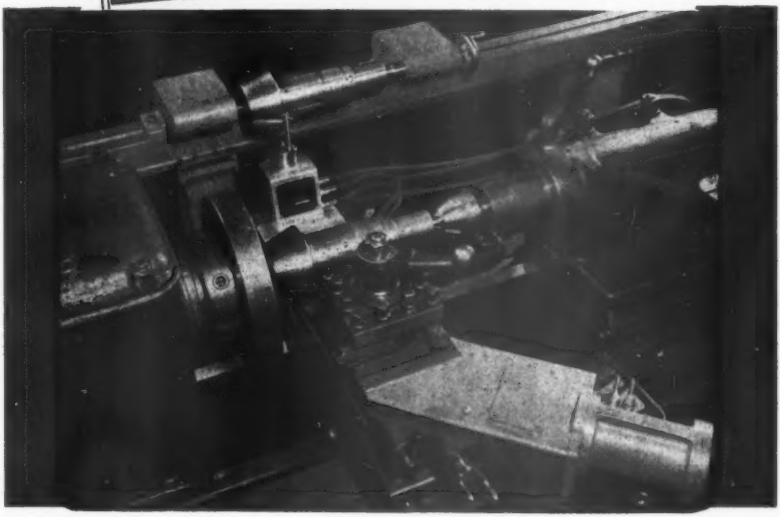

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as with other types of carbide tools.

An 8° RH spiral at the drill lip increased to a 15° RH spiral for the flutes through the drill body, gives a free movement of chips out of the hole.

### Drilling Equipment

As mentioned, special drill equipment either as to machines or fixtures is not required to take advantage of carbide drills. The same equipment can be used as for high speed steel drills, providing these machines are equipped with power feed and have sufficient power reserve. Speeds or feed rates can simply be stepped up so that increased output is obtained in addition to the longer tool life. It is not good practice, however, to increase speeds or feeds if the motor is overloaded to the extent that it slows down the spindle during the cut. Similarly, clutches should also be checked under these conditions. If an increase in motor load should produce tendency for the clutch to slip, drill life obviously would be affected.

Radial drill presses are well suited to the use of carbide twist drills for drilling of cast iron. As with high speed steel practice, desirable precautions include keeping spindle end play to a minimum and checking the alignment of drill jig bushings with an indicator if drill bushings are used.

With regard to drill holders, best practice is to fit the drill directly into the spindle socket or into reducing sleeves. Quick-change types of holders can be used, but floating holders are not recommended.

Spindle nose sockets, reducing sleeves and drill shanks should be kept free from burrs to maintain drill alignment with the guide bushings and to keep the drill running true. However, this practice is no different from good practice with high speed steel drills.

### Speeds and Feeds

In drilling cast iron with carbide twist drills on conventional equipment, practically any speed in the range of 75 to 200 sfpm gives good results. At the lower end of the range, tool life is roughly ten times that for HSS twist drills. At the upper end of the range, life is approximately 3 to 4 times that for steel drills running at lower speed on the same job.

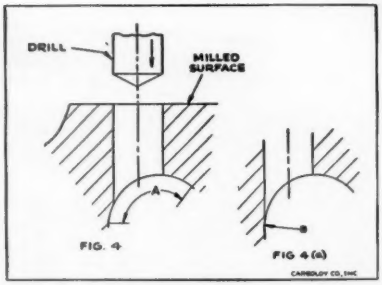


**Fig. 4. On this cast iron job the drill enters a clean surface but leaves through a scaly and sand-impregnated surface "A." Slight shifting of the casting core can cause the troublesome condition shown at "B" creating excessive wear on drill lips next to the drill margins. HSS drill life per grind varied from zero to 40 holes. A carbide-tipped drill, at doubled speed, gave 750 to 1000 holes per grind.**

There is no necessity for reducing feeds when the higher speeds are used with carbide drills. The selection of drilling speed (within the range of the equipment) therefore simply becomes one of balancing the increase in output against the increase in drill life desired.

In general, if the equipment permits, an attractive set of conditions for starting with carbides on a cast iron drilling job is to use the following:

**Speed: Twice that for HSS twist drills.**

**Feed: Same amount per revolution as with steel drills.**

**Rate of Penetration: Twice that with HSS twist drills.**

**Tool Life: 3 to 4 times that of HSS twist drills.**

Indications are that there would be some relationship between the depth of holes being drilled and the drill speed used with twist drills having brazed-in carbide tips. Speeds as high as 200 sfpm with .013" feed per revolution have been used while drilling 13/16" diameter holes up to 5½" deep from the solid without any sign of breakdown of the braze from the increased temperature developed by the longer drilling period and the greater accumulation of hot chips. For drilling holes much deeper than this, it might be

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advisable to use somewhat lower cutting speeds (but not lower than for HSS drills) when starting a job—at least until experience has demonstrated that higher speeds will not affect the braze as a result of the increase in operating drill temperature.

Drill feeds between .008" and .013" per revolution have given good operating conditions on quite a variety of jobs. Lighter feeds are not usually advisable. They seem to contribute at times to an erratic cutting action evidenced by objectionable vibration or "sing." Such vibrations seem to encourage breakdown.

If a carbide twist drill on a job does vibrate or sing, best practice is to increase the feed per revolution. In general this will not only give quieter operation but will also increase the number of holes per grind of the drill. In addition, number of grinds will also be increased, usually, since less material has to be removed in sharpening a carbide twist drill that has been operating properly.

In general, it might be said, it is better practice to increase output with carbide twist drills by first increasing the feed rather than speed—particularly if the equipment, operating conditions, or material being drilled do not permit the increasing of both speed and feed.

As a matter of fact output can be increased more effectively (with maximum tool life) for the harder cast irons by retaining the same speed as for high speed steel drills but increasing the feed per revolution.

**Operating Conditions**

It is always good practice to start drilled holes from machined surfaces. This aids in maintaining accuracy of hole location, as with steel drills.

When carbide twist drills are used in setups not employing bushed drill jigs, it is advisable to spot drill; this of course is also good practice when using HSS drills.

The conventional practice of center punching followed by spot drilling is quite satisfactory for carbide drills too. If desired, the spot drill can also be carbide tipped so that the operator will not have

*(continued on page 139)*

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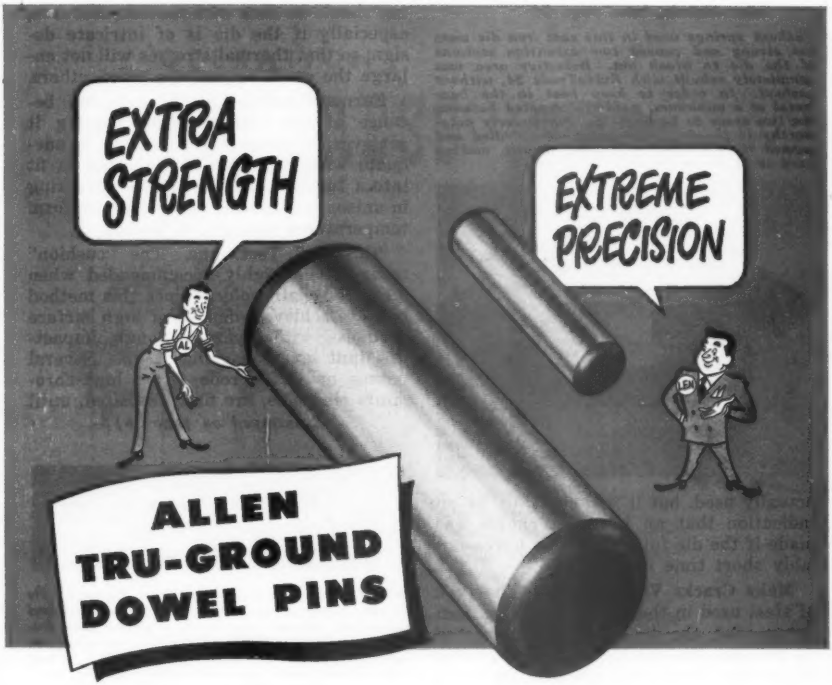


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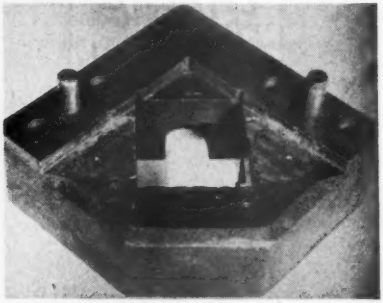
SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Filler Metals, from page 53

*Pushout springs used in this cast iron die were too strong and caused two extensive sections of the die to break out. Defective area was completely rebuilt with EutecTrode 24, without preheat. In order to keep heat in the base metal at a minimum, welder alternated between the two areas to be built up. Particularly noteworthy is the fact that holes were drilled and tapped right through the weld deposit, and no hard spots encountered.*



actually used, but it will certainly be an indication that an incorrect choice was made if the die failed after an unreasonably short time in service.

**Make Cracks Visible.** After the type of steel used in the original die has been determined, the die should be so treated as to make the cracks clearly visible. A Magnaflux machine, or the new Dy-check method may be used; if neither is at hand, inspection through a magnifying glass may prove adequate. The defect should be ground to a depth of at least ⅛", so as to make a minimum of three passes possible. The cracked portion must be completely ground out until sound metal is exposed; leaving a cracked portion below the weld will again cause progressive failure in a short time.

**Preheat.** Before the actual welding operation is begun, the die should be preheated, the preheat temperature depending upon the type of die:

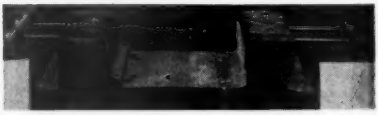
(1) **Oil Hardening: 300-400°F.**
(2) **Air Hardening: 600-900°F.**
(3) **Water Hardening: 250-450°F.**
(4) **Hot Working: 700-900°F.**

"Tempilstiks" are a reliable means of ascertaining these temperatures; if they are not available, the base metal temperature can be gauged fairly accurately by the color of the base metal. Preheating should be done with considerable care, especially if the die is of intricate design, so that thermal stresses will not enlarge the crack or perhaps cause others.

Furnace preheating is preferred because of the uniformity of heating it achieves, although torch heating is adequate when the part is too large to fit into a furnace. Several torches working in unison will aid in maintaining uniform temperatures throughout the die.

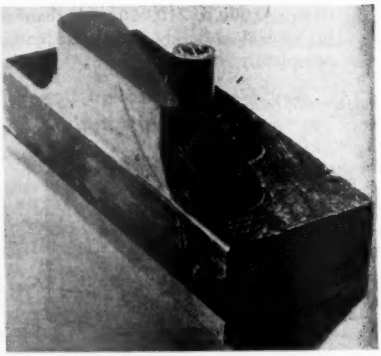
**"Cushion" Technique.** The "cushion" technique is highly recommended when dies are repair-welded, since this method helps to achieve a deposit of high surface hardness, with layers of tough, impact-resistant layers backing it up. Several passes of EutecTrode 68, a high-chromium electrode, are first deposited, until

*(continued on page 76)*



*Above: The massive cast iron forming die shown in the photo had broken completely, and scrapping seemed imminent. Welding with EutecRod 185FC (torch), however, salvaged the unit for another period of "active duty." Break was ground out from both sides (double vee), repaired without preheat.*

*Below: Blanking die, which was repaired with EutecTrode 6HSS. Large portion of the die had broken off, approximately as indicated by the pencil line on the die. No preheat was used in this repair, which was effected completely with EutecTrode 6HSS.*



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The result . . . P-K Ground Thread Set Screws . . . free of nicks, burrs and tool marks . . . every screw a dependable Class 3 Fit. You can see and feel the difference . . . see why they were quickly recognized as the best buy in Socket Set Screws.

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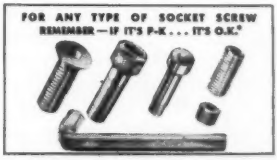


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Available Through Accredited Distributors.


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# A Report to Small Drill Users

*(Compiled from user reports, service records, and reports from field engineers and distributor salesmen.)*

# an analysis of shop performance by the first 750 Dumore Automatic Drill Heads

## What is this tool?

The Dumore Automatic Drill Head is a compact, motor-driven head with self-contained air compressor for advancing drill. Sensitive and automatic control of speed and feed gives increased production and less drill breakage. Head can be operated manually, or automatically, with any number controlled from one master switch. Drill capacity is No. 80 to 3/32" in steel and No. 80 to 1/8" in zinc, aluminum, brass, etc., and No. 80 to 5/32" in plastics and wood.

## Who bought the first 750?

Drill Heads were purchased by both small and large shops in almost every industrial classification. Determining factor apparently was whether or not production quantities of small holes were involved.

## How did production stack up against advertised claims?

The majority of users reported increases greatly in advance of company claims for the tool. In every case, where the heads were applied correctly within rated capacities, production was definitely increased. We have reports from users listing savings of $10,000 a year from around $400 investment in two Drill Heads; cost reductions of 97%; etc. Unquestionably, in many cases, the user's skill in designing jigs and fixtures to utilize the Drill Head's tremendous output potential was a determining factor in obtaining an above average percentage of production increase.

### How much was saved on drills?

Savings of 14 to 20 small drills per shift were quite common. Figuring an average cost of 30¢, drill savings alone often paid for the drill heads in a matter of months, to say nothing of even larger savings from reduction of scrap loss and downtime. Although users were conscious of these economies, it was generally agreed that the spectacular production increases obtained were still more important.

### What "bugs" turned up?

For a new tool, mechanical problems have been remarkably low. There have been no mechanical "bugs," and only a few headaches have resulted from the abuse of these precision tools by the operator. These include:

1. *Operation of the tool beyond Dumore rated capacity, which is always bad practice.*
2. *Clamping the housing too tightly in the set-up, which destroys close operating tolerances and causes friction and heating.*
3. *Use of an unrecommended oil, which gummed precision parts and, in some cases, froze heads.*

In every case, correction of the bad operating or maintenance practice resulted in satisfactory production from the tool.

### Repeat business — the acid test?

Repeat business has been heavy! Where hole volume justified multiple heads, purchase pattern shows initial purchase of one head for trial, followed by quantity re-order and repeats as head proved out. For instance, one eastern firm now operates 40 Dumore Drill Heads and plans to order 40 more.

### How much does a Dumore Automatic Drill Head cost?

Less than $200. A complete line of accessories, including bench stand, repeat-cycle timer, and remote control switches are available.

### What is the delivery situation?

Good. 3 to 5 weeks at time of writing. We're stepping up output to meet current heavy defense demands and still hold to the present delivery schedule.

If you're doing production drilling with No. 80 to ⅛" drills, you should investigate this revolutionary production tool. It's easy to figure the savings the Dumore Automatic Drill Head can make for you, in your own plant . . . on your own jobs. Write today for complete information, including job data reports, that will help you reduce your drilling costs.

**THE DUMORE COMPANY**

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DDH-8

BUILDERS OF MACHINE TOOLS AND MOTORS

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Filler Metals, from page 72
the ground out crack has almost been completely filled. These layers serve to form a cushion of relatively softer, but extremely tough material which will absorb most of the shock of repeated, suddenly applied loads, and will protect the final overlay of tool steel against these severe stresses.

The properly selected electrode (6 OH for hardening, 6 AH for air hardening, 6 WH for water hardening, 6 HSS for high speed steel) is used for the final pass so as to achieve a punch or die surface of uniform hardness and structure. Care must, of course be taken that the tough "cushion" layers do not extend into the surface of the die, since the cushion alloy is not as hard as the tool steel, and wear would occur prematurely in those areas.

**Polarity Check.** Checking the polarity of the generator—when using DC—seems like a minor point, but it has often made the difference between a first class repair job and discouragingly porous, sloppy results. Set the generator on reverse, run a bead on scrap metal, and grind the surface. Change the polarity if traces of porosity are evident. By the same token, it is advisable to strike the arc on a piece of scrap before starting on the die proper, so as to warm up the electrode end and eliminate chances of porosity in the weld. Each pass should be peened with a light peening or flux chipping hammer to relieve thermal stresses due to cooling.

**Welding Heat.** During the welding operation, heat that builds up in the die should be watched very closely. It should NEVER exceed the maximum draw range. Here again, EutecTrodes 6 AH, 6 WH, 6 OH, 6 HW prove of advantage since their lower-heat operation means longer welding time with fewer "time-outs" to wait for the die to cool down again. After the welding operation has been completed, the die should be tempered to relieve surface or residual stresses, and to achieve a somewhat tougher structure in the die.

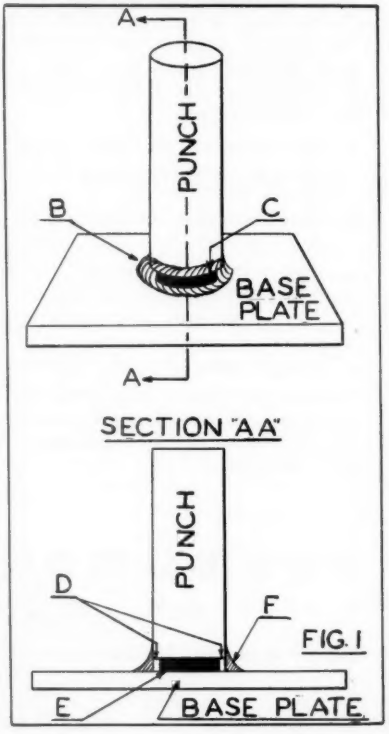
### Composite Die Construction

The second phase of tool and die welding is construction of composite dies. Here the purpose of welding is to simplify the job of building the original die. By assembling the die out of several components, it is usually possible to eliminate any number of intricate machining operations, and simplify the design of the die. In addition, this method affords a means of using expensive high-alloy steels only for the actual cutting edges or surfaces of the die, and a cheaper plain carbon steel for the shank or supporting member.

By way of a simple illustration, let us assume we wish to build a round punch to blank out a 6-inch disk. Instead of having to use a 6-inch cylinder

*(continued on page 80)*

*Fig. 1. The weld metal "B" and "F" joins punch to base plate. Copper shim "C" and "E" is of smaller diameter than punch and is free of weld contact. Hollow area "D" permits shim to flatten out under impact.*



. . . w[illegible] struggle with
a hea[illegible] die when a
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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# Die Casting Die Design

## Part IV (Continued)

### Design Suggestions to the Die Casting Die Designer

**Rule I: Shape.** The gate has but two dimensions, depth and width, Figure 63. The former dimension may vary from .008" for small lead, tin, and/or zinc base alloys to as much as .075" for large die castings of aluminum or copper base alloys. Generally a gate depth of .015"—.025" is employed for zinc base alloy die castings; a gate depth of .020"—.030" is

*by* **H. K. Barton**
*and*
**James L. Erickson**

employed for magnesium base alloy die castings, and a depth of .20"—.40" is generally used for aluminum base and copper base alloys. However, there are no hard and fast rules for gate depth.

Too shallow a gate has certain disadvantages, of which the most notable are:

(1) the effect of restricting flow excessively, thereby preventing the free flow of the molten alloy into the die cavity;

(2) preventing adequate feeding of the die cavity with new molten die casting alloy when such feeding is necessary during the period of solidification, contraction and shrinkage of the alloy within the die cavity;

(3) tendency to engender an excessively high incoming molten alloy jet velocity. This is frequently undesirable in that such high velocity leads to:

(a) excessive turbulence within the jet itself and subsequently within the main mass of molten alloy within the die cavity;

(b) welding of the molten die casting alloy to the die cavity face at the point at which the incoming molten alloy jet impinges upon the die cavity face; and

(c) a stream of molten alloy that may flow along the surface of the die cavity face, sealing off any or all portions of the vents provided for the escape of the air present within the die casting die;

(4) may lead to the formation of undesirable heat blisters on the surface of the die casting proper in the immediate vicinity of the gate. Heat blisters are a result of the heat generated by the frictional forces acting upon the molten die casting alloy as it passes through the gate; and

(5) may lead to premature heat checking of the die casting die steel in the gate area for the reason given in (4).

Too great a gate depth likewise leads to certain undesirable consequences, as:

(1) very difficult shearing of the feed from the die casting proper — overly thick gates must be removed by sawing, at an extra expense;

(2) porosity lying within the gate area whose presence becomes quite noticeable after the die casting proper is sheared from the feed;

(3) the need for additional polishing at the gate area in order to remove any surface blemishes that are present at the gate; and

(4) reduction in the velocity of the incoming molten alloy jet so that it becomes difficult to properly fill the remote portions of the die cavity. This is especi-

*(Continued on page 110)*

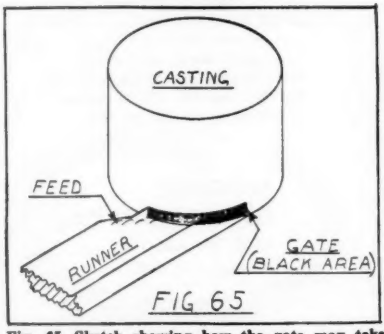


**Fig. 65. Sketch showing how the gate may take the shape of a curved plane when a round surface is fed.**

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Filler Metals, from page 76

of expensive tool steel, we can use plain carbon steel, which is not only cheaper, but much easier to machine to the desired dimensions. Then, by cutting an annular groove where the cutting edge is to be, we can "overlay" this cutting edge with one of the tool steel electrodes, harden it, then grind to final size, and the punch is completed.

**"EuteCushion" Shim.** One little trick that may be worth remembering when welding composite dies is the use of a shim or "gasket". When welding a tool steel punch, for example, to a carbon steel plate, it has always been considered extremely difficult to perform this operation without cracking the tool steel. By inserting a thin shim of copper (.003" to .005") between the two sections, then welding them with a special electrode (EutecTrode 68) it will be found that cracking can be avoided. Any stresses developed due to the contraction of the weld or base metal will be taken up by the copper shim, which in effect will merely flatten out as needed.

To be certain that the copper shim will not be arc-tacked to either section and thus prevented from flattening out, it is advisable to cut the shim so that it will reach to within about ¼" of the smaller section to be welded. This procedure is illustrated in Figure 1.

The oxy-acetylene torch offers simple means of achieving the same end result, especially when used in conjunction with "EuteCushion" shim. This newly developed product consists of a special "cushion" alloy to which coatings of EutecRod 1601 (high-strength, heat-resistant) or EutecRod 1800 (fastest melting) have already been pre-applied on both sides. It is thus necessary only to add the proper flux and heat the joining alloy to its melting temperature; the punch will then be welded to the plate, Figure 2, with a shock-absorbing "cushion" between the two.

### Correcting Design

Correcting the design of dies is in a way very similar to composite die construction. A very elementary example of the usefulness of this method, think of a special size reamer needed to ream a very deep hole. Special size reamers are hard to get, to begin with, and expensive. But when it comes to getting a special size reamer with an extra long shank, it may not be possible to obtain such a tool at all, regardless of cost. How much simpler is it to take a standard length reamer and weld on a plain carbon steel shank of the requisite length.

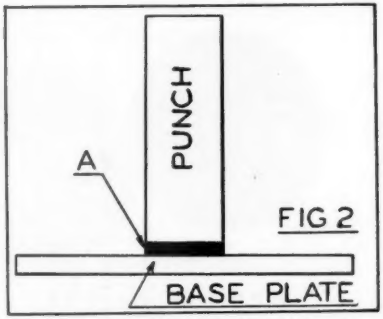



*Fig. 2. The "EuteCushion" shim "A" performs the double duty of joining and cushioning.*

Similarly, suppose a die looks perfectly all right on the drawing board; the shop builds it strictly according to specifications, puts it on the press, tries it, and instead of the desired shape you get a wrinkled, distorted piece of scrap. Unfortunately, die design has not as yet been perfected to the status of an exact science, and much of the work is based on empirical formulas and individual experience, so that an occurrence such as the one just outlined is not at all impossible or far fetched.

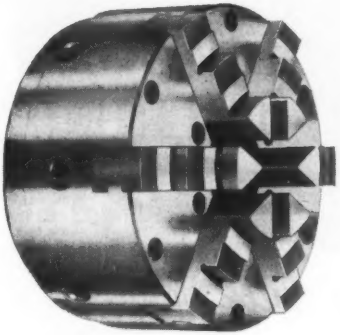
Fortunately, however, a very minor change in the design of the die has often made the difference. A little metal added to the die in the right spots and the finished part has exactly the desired shape or size without so much as one wrinkle. And the quickest way to add metal where it is needed is to weld it on. The same thing holds true for minor design changes necessitated by new models.

### Correcting Errors

Almost analogous to design changes, the rectification of errors is the fourth

*(continued on page 143)*

Buck AJUST-TRU CHUCKS



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**6 JAW PRODUCTION COLLET CHUCK**
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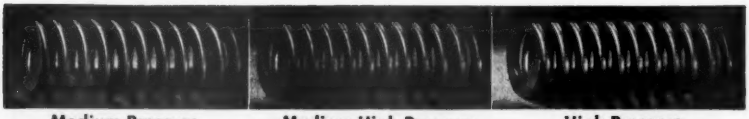

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## A "Neat Trick" in Manpower Conservation

**Twenty former General Electric engineering and sales experts (left) pose with 20 young company engineers whom they succeed as "guides" on the firm's now-famous "More Power to America Special" exhibit train. By volunteering for three-month return to General Electric service, the retired specialists free their younger counterparts for defense engineering and production assignments.**

★ ★ ★ ★ ★ ★ ★ ★ ★

## Trade Association Activity in the Defense Effort

Recognizing that trade associations play a vital part in the present defense effort by keeping their members informed on government controls, regulations and laws affecting their particular industries, TOOLING and PRODUCTION presented some leading questions to those associations covering the metalworking field.

Knowing that the procurement divisions of government agencies and the military services require that bidders on prime contracts and subcontracts must meet certain requirements as to plant facilities, ability to perform, personnel and labor sources, the following questions were asked, pointing toward the data which a prospective bidder should be prepared to present when bidding.

**What Suggestions Have Been Made:**

1. To top management for planning their defense activities of production, sales, accounting, reporting, and legal departments?

2. With respect to materials, supplies, and component inventories?

3. About preparation of a production and production control record from World War II (if one has not been preserved)?

4. About compilation of sales and shipping facilities data from World War II?

5. About compilation of data on personnel, labor sources, training and industrial relations? Provisions for detecting existence of subversive activities?

6. About an itemization of plant layout, equipment, maintenance and expansion?

7. With respect to compilation and review of a list of military items and materials produced during World War II?

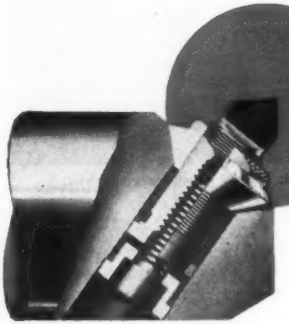
Have you advised your members to contact their local office of the U. S. Department of Commerce for all information pertaining to bidding on government contracts?

The replies indicate that the associations are very active in keeping their memberships informed on government procedures, either through national and

*(continued on page 136)*

# microbore

## ... aids defense conversion

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Automotive Drawing, from page 51

In evaluating an experimental drawing compound (or new part designs or new tool adjustments) a blank is frequently scribed to provide 1" squares, and after forming it is cut in sections so that change in metal thickness as well as distortion of the squares can provide data showing the effect of the drawing compound on metal flow.

Besides benefiting the customer, laboratory performance tests would aid the quality control and research programs of drawing compound suppliers, who cannot maintain sheet metal press production lines for such work.

There appears to be a trend away from witchery involving secret ingredients and compounding techniques and more of a willingness by suppliers to at least agree that the compounds can be classified according to type.

Since there are obvious advantages in keeping the number of compounds on hand to a minimum, products adaptable to available application equipment and which can be diluted with water and/or oil in different concentrations, depending upon the job have definite advantages.

Figures 1 & 2 show typical application of drawing compound to Fenders, Door Panels and Hoods, respectively.

Dry coating type compounds eliminate the mess usually found around presses using wet compounds, but have not been used generally on sheet metal because special facilities are required for coating and drying the blanks, drawing quality is not the best possible because there is little cooling action, and, in some operations, the coating piles up on the tools. Humid weather tackifies some such compounds so as to complicate handling sheets and to reduce drawing efficiency.

Fig. 4. Automatic spray application of soap-wax coating to sheets from which oil pan blanks are sheared.

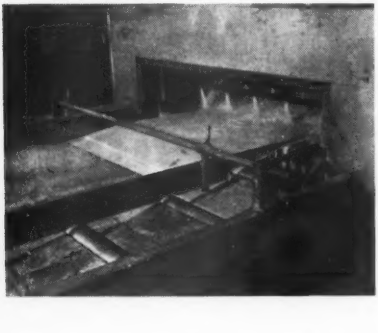


Fig. 5. Dried, coated blanks are stacked.

We use a dry, sodium borate soap type compound in the manufacture of rear axle housings, a new installation, where layout space permitted room for the necessary equipment. After alkali cleaning, the tubes are dipped in a 200°F. soap-borax water solution and dried (Figure 3). Concentration of this solution which is controlled by titration, effects the length of housing obtained in the subsequent drawing operation.

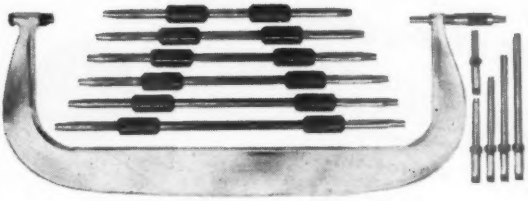
In another dry coating operation, oil pan blanks are automatically spray coated (Figure 4) with a soap-wax solution and dried and stacked (Figure 5) on pallets. The pallets are transferred as required by fork trucks to the blanking and drawing presses.

### Properties

Drawing compounds represent a compromise of many properties. The customers' particular problems and special peeves influence the priority given them in screening out the most promising new compounds for test. For example, the

*(continued on page 96)*

# The TUMICO Bar Micrometer



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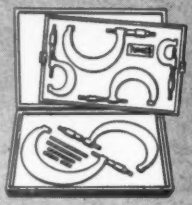

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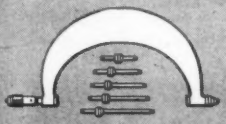

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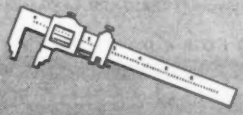

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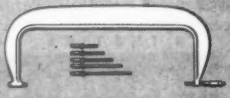

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A conventional press, when equipped with a U. S. Slide Feed, Straightener and Stock Reel, is converted into an automatic machine. (See photo at top left). U. S. Slide Feeds are recognized as the most accurate on the market for feeding coil stock automatically into punch presses. Their accuracy results in material savings, increased production, lower die costs and reduced maintenance.

The illustrations show a few of the units in the line of U. S. Automatic Press Room Equipment. Complete specifications are contained in Bulletin 80-T. Write for your copy.

U. S. Power Driven Straightener, pedestal type, with variable speed drive and mercury switch control. Made in a range of sizes. Unit shown accommodates material up to 18" wide x 1/16" thick.

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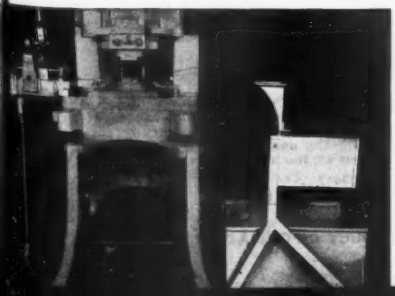
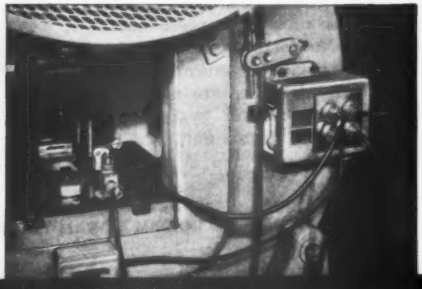
**U. S. Automatic Press Room Equipment**
**U. S. Die Sets and Accessories**

Below, Left: U. S. Scrap Chopper shown used with a conventional press. Scrap Chopper is individually motor driven, and can be moved wherever desired. Right: U. S. Multi-Stop mounted on press. Can be set up with up to four micro-switches to stop press if stock buckles, if end of coil is reached, etc.





# Delicate Watch Parts Produced with High-Speed Accuracy

A precision swaging operation on small pallet fork blanks at The Elgin National Watch Company, Elgin, Illinois, illustrates the extreme accuracy required to produce the many intricate parts for fine watches and other jewelry items. These blanks, so tiny they must be loaded into tooling fixtures by tweezers, Figure 1, are swaged at the rate of 7000 a day on a standard 8-ton oil-hydraulic Multipress, with index table, made by The Denison Engineering Company, Columbus Ohio.

The pallet fork blanks are T-shaped metal parts, and in swaging, a small point is formed on one end. Diameter of this raised point must be accurate within

**Fig. 1. Minute size of the T-shaped metal pallet fork blanks for watch mechanisms is here indicated by the number of parts held on the Multipress operator's finger. Use of tweezers is necessary to load these into the die.**

.0004" and the height within .002". In this operation, costly dies in special fixtures are mounted on the index table, and 4-ton pressure is accurately exerted by the press ram. The press operator, in addition to loading the dies, gages the swaged parts to determine whether the required tolerances are maintained.

Through the control system of the press hydraulic power unit, the index table operates from, and in positive sequence with, action of the press ram for continuous and automatic cycling. Only three of the six stations on the index table, Figure 2, are tooled for this operation. A skip-station feature on the Multipress permits hurdling the other three positions without loss of production time. While the operator loads a part into the fixture near the front of the index table, Figure 3, the press ram is descending to close the dies and swage the part in a loaded fixture on the opposite side of the table. The operator's hands are always at a safe distance away from the moving ram.

*(continued on page 150)*

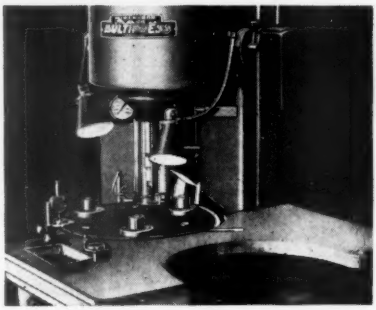


**Fig. 2. This equipment used to swage pallet fork blanks in the manufacture of Elgin Watches includes a standard 8-ton Denison oil-hydraulic Multipress and index table specially tooled for this operation.**

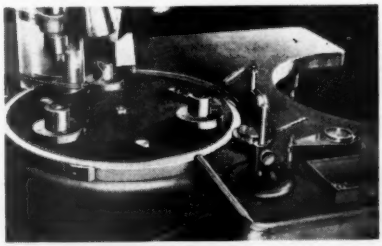


**Fig. 3. The Multipress operator loads the small watch part into the fixture at front of the index table dial which automatically rotates first to bring the part under the ram for swaging and then to the air ejection station.**

Photos courtesy The Denison Engineering Co.

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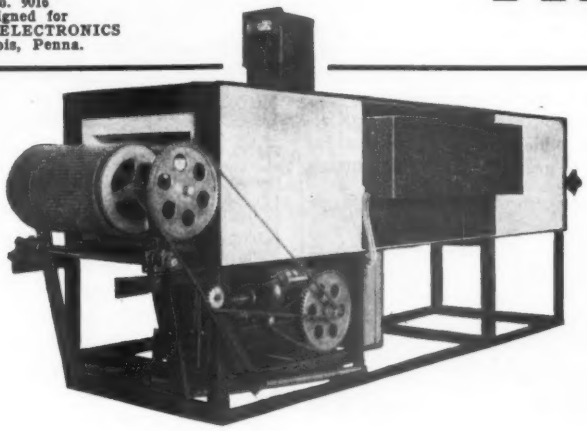

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# New Technique for Machining Hardened Steel

A new machining technique has been made possible by The DoALL Company, Des Plaines, Illinois, with its introduction of the DoALL Line Grind Band on the DoALL Contour-matic Band Machine. This cutting tool and machine combination will do precision "Vertical Grinding" on inside, outside and contour cuts in hardened metals. With this new Line Grind Band, grinding operations are done with a continuous band tool which reduces the limitations on depth and height of cut as well as contour shaping.

The band tool, Figure 1, is a tough alloy band on which cubical molded abrasive matrices are welded. In its cutting action there is an equalized balance between bonding and abrasive grits which gives a constant degree of abrasive exposure. The Line Grind Band is manufactured in two types and in two grit sizes which gives a complete selection for cutting and grinding many different types of hardened materials. One band is made of aluminum oxide which is recommended for grinding heat treated alloy steels, heat resistant steels and wear resistant non-ferrous alloys. The other type, namely Silicon Carbide Line Grind Band, is recommended for grinding and cutting of geological, silicified and vitrified materials; glass, quartz, marble, granite, etc.

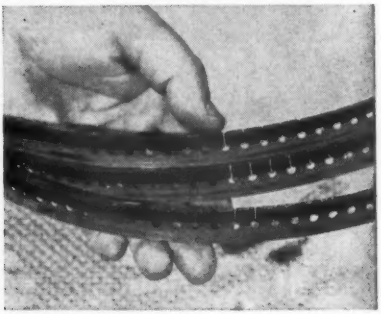

**Fig. 1. Cubical molded abrasive matrices are welded to a tough alloy band to make up the Line Grind Band.**

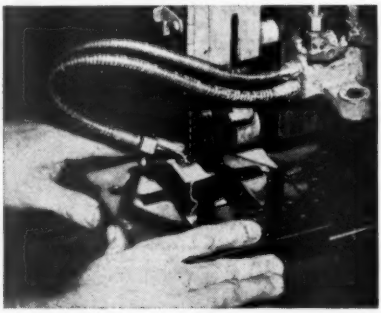

**Fig. 2. Line Grind Band in operation on Contour-matic Machine "cutting" out damaged section of broken die.**

Figure 2 shows the Line Grind Band in operation on the DoALL Contour-matic Machine which has made possible the repair of a broken die, Figure 3, by "cutting" out the damaged section. It required only six minutes to remove the square inch of Ketos steel hardened to 59 Rockwell C.

The Line Grind Band can be used only on a DoALL Contour-matic Machine since it has all of the features necessary to give maximum and efficient performance. These necessary features are vernier controlled table feed, flood coolant, maximum rigidity, and variable speed range of 5000 to 6000 fpm.

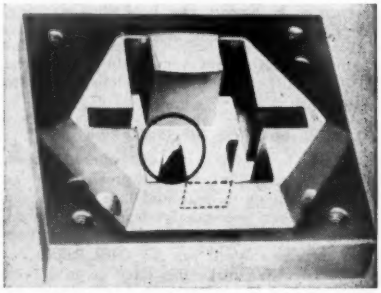

**Fig. 3. Broken section of die.**

Photos courtesy The DoALL Co.

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . **Automotive Drawing, from page 88**
emphasis in recent years on cleanability and weldability without cleaning has sometimes undully reduced drawing efficiency.

The properties we look for in a drawing compound are:

**(1) Adequate drawing qualities** or friction control. We say "control" because, although low friction is generally desirable, if it is too low, an undue slippage may cause excessive buckling and breakage on some application.

**(2) Application.** Is mixing required on the job? Can it be sprayed as well as brushed, dipped, or roll coated?

**(3) Stability.** Does it settle out, become rancid, freeze?

**(4) Toxicity.** Are toxic fumes liberated? Does it cause dermatitis?

**(5) Weldability.** Can unwashed, formed panels stored over week-ends be resistance-welded satisfactorily?

**(6) Rust Protection.** Is the drawing compound itself corrosive, requiring prompt removal? Does it offer enough rust protection so that formed parts can be shipped to assembly branches (10-day indoor storage typical), or must it be removed and a rust preventative applied?

**(7) Washability.** Is it readily removable with a mild alkali or emulsion cleaner, or is solvent cleaning and/or mechanical abrasion also required?

### Ford Material and Process Specifications

A "Ford M number" or material standard is assigned to materials used by the Ford Motor Company. This number serves to identify the material for stock purposes and it appears on corresponding material specifications. A typical Ford drawing compound specification, **M-13884-E, Water Emulsion Draw Compound,** is shown in Chart 1.

In our drawing compound specifications, the chemical analysis of the initially approved product is given as a general guide to help classify it, but the final approval is contingent on its successfully passing a rigid shop trial. Chemical analysis of production shipments from all sources is required to be the same as that obtained on the approved purchase samples from the same source as a check on consistency and value received.

**Chart 1. Material Specification**

**WATER EMULSION PIGMENTED DRAW COMPOUND FOR EXTRA HEAVY DRAWING**

## 1. SCOPE

The material desired under this specification is a Water Emulsion Pigmented Heavy Duty Draw Compound suitable for use as a lubricant in deep drawing such parts as roof panels, flywheel housings and tractor instrument panels.

## 2. REQUIREMENTS

**2.1 Composition.** The material shall be composed of a combination of oils, fats and a pigment compounded to produce a material smooth in appearance and from coarse particles.

Material possessing the following characteristics has been found satisfactory:

| | |
|---|---|
| Soaps | 22% |
| Water | 50% |
| Pigment (Calcium Carbonate) | 28% |
| Pigment Particle Size | 325 Mesh |
| Color | Light Tan |
| Odor | Neutral |
| Consistency | Paste |
| Wt. per Gallon | 9.9 lbs. |

**2.2 Quality.** Production shipments shall be equivalent in quality to the original approved purchase sample when subjected to laboratory and production tests.

Suppliers shall obtain approval prior to making any change in the formulation of the materials supplied under this specification.

Note: The material must be free of all foreign impurities such as dirt, wood, etc.

**2.3 Application.** The material shall be suitable for application either by brushing or spraying.

**2.4 Mixture Ratio.** The material shall be of the same consistency as the original approved purchase sample and shall be suitable for mixing in various ratios with water. A typical mixture ratio is two parts of material to one part water.

**2.5 Grain Size.** 100% shall pass through a 60 mesh screen.

**2.6 Pliability.** The material shall remain pliable after application and shall not harden.

**2.7 Drawing Properties.** The drawing properties of the material shall be equivalent to the original approved purchase sample.

**2.8 Stability.** The material shall show no signs of separation, hardening or caking nor shall it turn rancid, while standing, during normal storage periods.

**2.9 Toxicity.** The material shall be free from toxic fumes and shall have no tendency to cause dermatitis.

**2.10 Weldability.** The spot welding qualities of the dried film shall be equivalent to the original approved purchase sample.

**2.11 Rust Protection.** The rust protection properties of the dried film shall be equal to the original approved purchase sample.

**2.12 Cleaning.** The material shall be easily removed by the methods described in MS-9-1 under procedure "B" and "C."

**2.13 Acceptance.** This specification is not intended to limit the composition or method of manufacture. Material submitted to this specification will be given a practical shop test on a comparison basis against the original approved material will be valued, by the Quality Control Laboratory, in general upon these results. The Quality Control Laboratory conducting these tests shall acknowledge a new vendor with written approval to Purch. and to the Spec. Sec. of the Mfg. Res. Dept.

**Chart 2. Process Specification**

**APPLICATION OF DRAW COMPOUNDS**

## 1. SCOPE

This specification covers the methods of application of Drawing Compound used in producing current production parts.

## 2. METHODS OF APPLICATION

Drawing compounds are used as received in most cases but they can be used with water or with oil or in combination with both. Dilution of drawing compounds depend upon the depth of draw, stock and manner of application. Blanks shall be free from grit, metal chips and shop dirt when compound is applied.

2.1 **Spraying.** Spray guns with a No. 4 opening are used in most spraying operations. Air line pressure and atomizing pressure should be not over 5 lbs. more for compounds used as received than for compounds that have been diluted.

2.2 **Brushing.** Apply the desired drawing compound to the blank and die according to proved methods with suitable brushes applicable to reach the critical area.

2.3 **Rolling.** Pass blanks through rollers coated with drawing compound so that both sides are completely covered.

2.4 **Dipping.** Coat the entire surface area of the blanks by submerging completely into the desired drawing compound.

Ford process specifications give approved methods of using materials in a manufacturing process. The title page and a typical page from the text of **Specification MS 11-1, Application of Draw Compounds,** are shown in Charts 2 and 3. This specification assists supervision in seeing that the right amount of the specified drawing compound correctly applied is used on the job and is a valuable reference in conducting shop trials.

Correct application of drawing compounds cannot be over emphasized. Sometimes management which is quite impressed by a 10% difference in cost per lb. between two drawing compounds, is indifferent to the use of 500% more compound than required on a job. Automatic application (spray, injection, dip or roll coat) is becoming more prevalent because, in addition to reducing labor cost, it assists in obtaining a consistent quantity in the right place.

### Selecting the Corrective Type

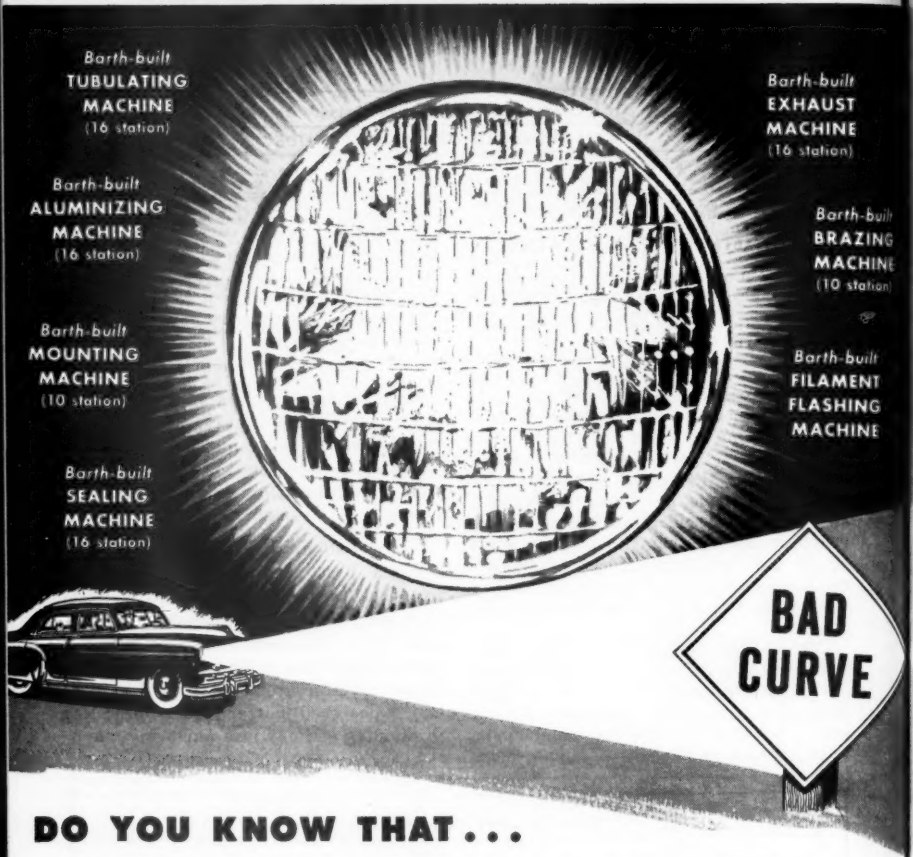
At a first glance, it might appear practical to tabulate automotive parts such as fenders, roof panels, etc., and give the corresponding drawing compound type used by the industry. Even if all manufacturers started with identically designed plaster models, practices in dividing the car into parts for manu-

*(continued on page 100)*

**Chart 3. APPLICATION CHART**

| PART NAME | Compound | Amount Per Panel | Meth. of Application | REMARKS |
|---|---|---|---|---|
| Ford Hub Cap | M 1082 | 0.09 oz. | 2.4 | Use as is. |
| Mercury Hub Cap | M 1083 | 0.09 oz. | 2.4 | Use as is. |
| Ford Front Fender Apron | M 13884A | 0.56 oz. | 2.1 | Spray entire area with one gun. |
| Flywheel Housing | M 13884E | 0.57 oz. | 2.3 | Mix compound with 1 part water and brush |
| Ford Front Fender | M 501 | 0.10 oz. | 2.2 | bead and radius areas of die and blank. |
| | M 13884F | 0.10 oz. | | |
| | M 13884A | 0.202 oz. | 2.1 | Use as is. Spray headlight area with one gun. |
| Ford Hood | M 13884J | 0.168 oz. | 2.1 | Spray nose area with one gun. |
| Cowl Side | M 501 | 0.126 oz. | 2.2 | Mix compounds together and cover entire |
| | M 13884F | 0.126 oz. | | blank. |
| Inner Door Panel | M 584A | 0.66 oz. | 2.1 | Mix 5 parts compound with 1 part water and spray entire area with four guns. |
| Extension Panel | M 501 | 0.218 oz. | 2.2 | Mix compounds together and brush on bead |
| | M 13884F | 0.072 oz. | | areas of die and blank. |
| Ford Outer Deck Lid | M 501 | 0.137 oz. | 2.1 | Mix compound together and spray entire area |
| | M 13884F | 0.137 oz. | | of blank with 4 guns. |
| Ford Inner Deck Lid | M 501 | 0.274 oz. | 2.1 | Same as above. |
| | M 13884F | 0.274 oz. | | |
| Ford Roof Top | M 13884E | 0.457 oz. | 2.2 | Mix compound with 3 parts water and cover all bead areas of the die and blank. |
| Ford Coupe Top | M 13884E | 0.64 oz. | 2.3 | Same as above. |
| Ford Tudor ¼ Panel | M 584A | 0.71 oz. | 2.2 | Brush on bead areas of the die and blank. |
| Ford Coupe ¼ Panel | M 584A | 0.71 oz. | 2.2 | Same as above. |
| Ford Front Inner Door Panel | M 584A | 0.66 oz. | 2.1 | Mix 5 parts compound with 1 part water and spray entire area with 4 guns. |
| Ford Rear Inner Door Panel | M 584A | 0.66 oz. | 2.1 | Same as above. |
| Ford 4 Door ¼ Panel | M 584A | 0.71 oz. | 2.2 | Brush on bead areas of the die and blank. |

SEALED BEAM HEADLIGHTS

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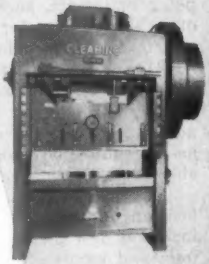

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Automotive Drawing, from page 97
facture vary so much among body and tool designers that depth of draw and degree of unequal drawing on a part, and sharp corners on the tool would vary considerably.

The severity of draw is a function of the yield strength of the metal, the coefficient of friction, surface smoothness, and degree and distribution of draw.

The most prevalent types of drawing compounds used are:

(1) **For mild draws and simple bends,** dilute soap solutions or mineral oil are generally used.

(2) **For medium drawing,** addition of polar materials, such as fatty acids or other source of polar compounds, or sulphurized oils, is common.

(3) **For severe drawing,** finely divided solids, such as calcium carbonate, flowers of sulphur, clay, or lithopone are often added to the polar compounds, and reactive compounds containing sulphur or chlorine are sometimes used.

The above is, of course, an over-simplification because dozens of combinations, including low melting solids, metal coatings and emulsifying agents other than soap, and dry soaps and plastics have been used in special applications.

On the job, the order of preference won't always be in the order of drawing efficiency because consideration also has to be given to washability and other such properties previously listed, as well as to price.

While there are indications that phosphate coating of stock with marginal physicals will reduce scrap in drawing body stock (probably because a better surface is provided for drawing compounds), it is generally more practical to use such marginal stock on less difficult draws than to go to the additional operation. Since much of the phosphated surface would be removed in later metal finishing operations, it would not replace the phosphating usually applied prior to painting.

One automotive application in which phosphate coating has shown definite advantages is in the forming of bumpers. The automatic polishing of steel in strips before forming bumpers greatly reduces costs because the setup does not have to be changed to accommodate designs of different customers or to provide for model changes. The following sequence of operations is typical:

(1) **Polish strips in the flat**
(2) **Alkali clean**
(3) **Phosphate coat** (Zinc phosphate spray)
(4) **Lubricate** (usually dry soap type film)
(5) **Blank**
(6) **Draw to shape**
(7) **Alkali clean or acid pickle** to remove phosphate coating
(8) **Continue with conventional plating cycle.**

The phosphate coating minimizes scratches due to handling the polished stock and increases the efficiency of the lubricant as a drawing compound and as a rust preventive. When it has served its purpose the coating is removed in the first stages of the regular plating cycle.

Before steel wire is cold drawn for use, in making bolts, etc. the acid pickled coils are coated with lime by immersing them in a water-lime slurry and drying. At the Ford Motor Company the wire is then drawn through draw boxes lubricated with a mixture consisting of (1) part aluminum stearate and (2) parts lime. Besides providing good drawing qualities a residual film of this material is retained on the drawn wire to minimize scoring in the bolt machine which performs the subsequent cold heading operation.

### Summary

Much progress has been made in recent years in developing new compounds, and better-controlled methods of using and testing them. Although present material specifications leave much to be desired, the present and increasing active interest is bound to result in better laboratory performance tests and in a clearer understanding of the principals involved in specifying drawing compounds.

The author wishes to express appreciation to Messrs. W. Duey, H. Novack and J. Tauber of the Ford Motor Company, for assistance in obtaining data for this report.

. . . Press Tool Maintenance, from page 60

The floor inspector for the area is charged with the responsibility for telephoning in the information every time there is a change in the status of the job. He also calls the area production superintendent concerned (there is one in each end of the plant) so that changes can be kept on a somewhat similar status board covering the operations in his area.

Once the area superintendent knows a job is in trouble, it usually doesn't take long to get it straightened out!

Although Statistical Quality Control is an important factor in the overall press tool maintenance program, other procedures more or less common in the stamping field are followed in the interest of preventive maintenance.

A regular schedule, for example, is followed for cleaning and steaming out the dies to remove dirt and other foreign material that can be removed without taking the die out of service for a lengthy period. Most of the punches are cleaned at lunch times and at every other opportunity.

A card system is maintained on all breakdowns. Actually, after sufficient history on a job has been built up, most breakdowns can be anticipated, and necessary changes made to avoid lost time and production. On our flywheel housing job, for example, we found that approximately every six weeks the control chart would show the operation going out of control. This was found to be due to die wear in the originating department, and required removal of the die for correction. With this forewarning, production can be planned ahead for the time when the die has to be removed, and it is possible to keep material flowing smoothly.

Perhaps the entire subject of inspection and maintenance of press tools at the Dearborn Stamping Plant can best be summed up in two words: Cooperation and Coordination.

Production and Quality Control can get nowhere separately. Each needs the other's help. Only through coordination of the efforts and objectives of all, can we continue to produce quality stampings.

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## Technical Data Program for Shell Machining

A broad service program of furnishing vital technical production data to defense industries so that such industries can obtain maximum productivity with minimum tooling in the manufacture of products for the armed services, has been initiated by Carboloy Co., Inc., Detroit.

First step in the program has been the accumulation of all currently available data on the machining of shell and compiling these data in a complete kit for the use of manufacturers who either already have shell production contracts or who are or may be bidding on such contracts.

Since the shell machining program includes material of a restricted nature, distribution of these data is being closely controlled. Each kit is registered. Although the kit itself—weighing over 5 lbs.—is remarkably complete, containing data not only on feeds and speeds, tool application and grinding, tool design and brazing, but also on tool layouts and methods of insuring maximum tool conservation, the service program to shell producers does not end here.

As soon as new developments in shell machining practices and equipment become available, supplementary data will be furnished to all holders of registered kits.

In general, kits are made up to suit the needs of the individual producer. There is a basic kit containing data on World War II practices and general information applicable to the machining of all sizes of shell. With this, as the case may be, goes specific information on the practices for different shell sizes. At the present time 90, 105, 120 and 155 mm. shell are already covered in this manner.

In order to control distribution, no kits will be mailed on request. Where a company already has a shell contract or where a company has been "cleared" by army ordnance to bid on shell contracts, a registered kit will be delivered to the company directly by Carboloy field engineers.

Carboloy Co., Inc., already has under way compilation of data on machining of other defense products, each of which is to be handled in a similar manner. In each case, important consideration is being given to ways and means of reducing consumption of carbide tools to the minimum by insuring maximum effectiveness of carbide tools where such tools are required.

★ ★ ★ ★ ★ ★

## Faster Sizing and Polishing of Carbide Dies

After much research and actual field testing in plants polishing carbide dies, the Industrial Products Division of Elgin National Watch Co., Elgin, Ill., has made available a new diamond abrasive compound prepared especially for sizing and polishing carbide wire drawing and heading dies. This new addition to the company's line will be known as DYMO-C.

Tests conducted in the field have shown DYMO-C to cut up to 20% faster than diamond-olive oil mixtures when applied to carbide. It is delivered ready to use; no mixing is required.

Other specific advantages of new DYMO-C for sizing and polishing carbide wire drawing, extrusion and heading dies are proper viscosity for convenient application, resistance to slinging and an inherent property of working down the lapping stick or pin to the actual work area.

In addition to these specific advantages, DYMO-C embodies all the features of standard Elgin DYMO Diamond Compound—convenience of application, resistance to drying out, deterioration or settling, and uniformly precise grading of diamond particles.

All production processes involved in the preparation of new DYMO-C, from crushing of pure diamond to final compounding, are performed under rigid laboratory control. Grading of diamond particles is certified to be in accordance with U. S. Bureau of Standards specifications.

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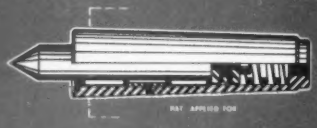

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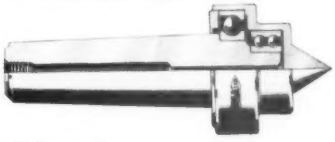

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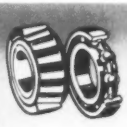

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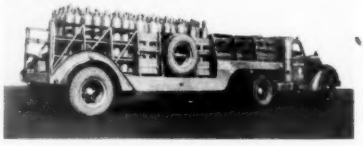

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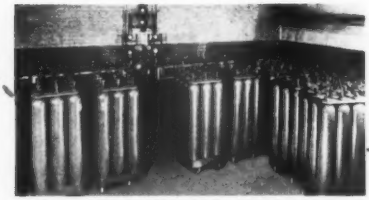

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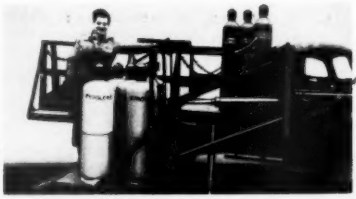

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| 1½" x 14" | 4" x 14" | 9" x 14" | 2½" x 2½" x 14" | 6" x 6" x 14" | 3½" x 4½" x 14" |
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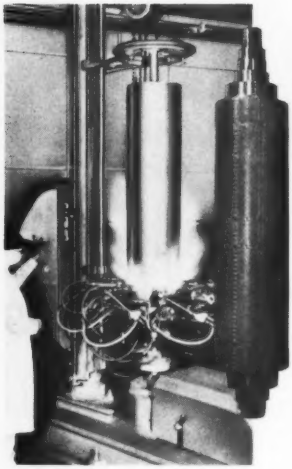

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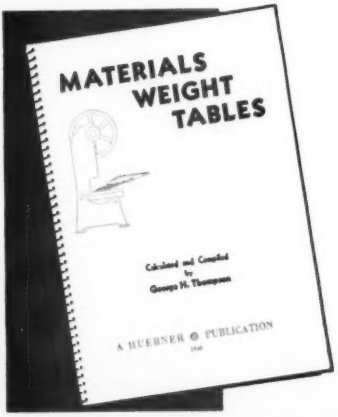


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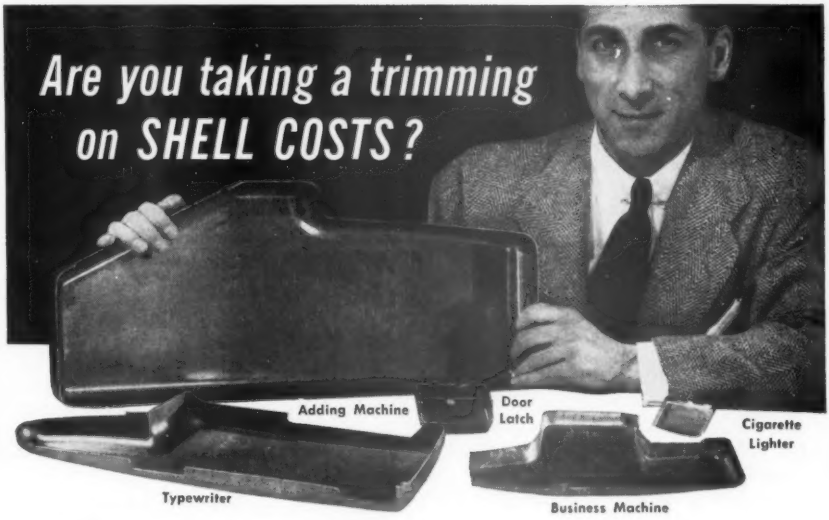


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Stock thickness makes no difference. Users of Brehm Dies have trimmed shells of .008 brass to .218 steel. Shapes or sizes make no difference: straight, curved, or notched edge contours, with sharp angles or projections. Shells small as the case of a lady's watch, large as the largest refrigerator doors. ***Submit your blueprint or shell for full information.***

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**Brehm Die Division, 1239 W. Columbia Street, Springfield, Ohio**

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BREHM DIE DIVISION • SPRINGFIELD, OHIO

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Plastics, from page 49

Fig. 6. Plastic checking fixture.

every curve and plane held to a close tolerance. It requires skillful work with plaster and spatula, and precise finishing of the set surface. When completed, the master pattern is treated with a parting agent that will allow ready release from the mold or female impression of the pattern.

Making of the mold begins with the construction of a supporting skeleton of wood or welded metal pipe, depending on the weight and size of the mold. The basic skeleton is placed over the pattern and smaller supporting members are attached closer to the pattern surface. Finally a network of wires is woven between the supporting members, and wet plaster is padded between frame and pattern. The first coats consist of pure plaster; as the thickness of the mold skin is built up fibrous materials are added to reinforce the plaster. The final thickness is determined by the position of the supporting framework, and is usually held to a minimum of one-and-one-half inches to insure rigidity.

Fig. 7. Mounting of plastic dies, male and female.

While the mold is in position over the pattern a complete boxlike wooden case is built around it to serve as protection and to aid in handling. After the plaster has completely hardened the entire mold assembly is lifted from the pattern, leaving the latter ready for the making of another mold.

On tool castings thicker than four inches, coring is required. By maintaining a uniform section throughout the casting whenever possible, internal stresses resulting from uneven curing are avoided. To accomplish this, cores are made up of plywood covered with wire mesh and plaster, and painted with a coating of resin to prevent leakage if they are designed to be permanently incorporated in the casting.

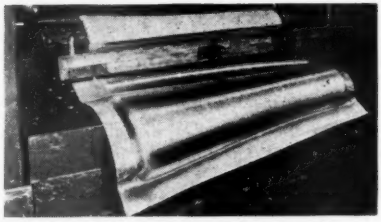

Fig. 8. Plastic draw die punch and work.

The mold is prepared for casting by applying a film that will separate the casting material from the mold both physically, to prevent bonding, and chemically, to prevent a reaction between the acid catalyst in the casting mix and the mold material. Tygon primer and paint manufactured by U. S. Stoneware, Akron, Ohio is recommended as sealer. One coat of primer and two coats of Tygon black is sprayed or brushed onto the mold surface. The manufacturer's instructions for drying time between coats should be followed. An even coat of liquid wax, such as Johnson's Glo-Coat, provides the parting agent.

*(continued on page 108)*

# Hole Location Practices

*Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc. 726 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.*

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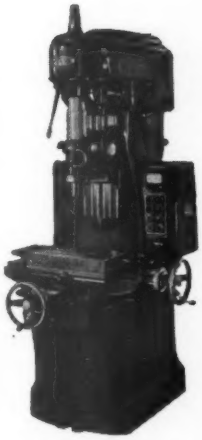

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Parlec Drill Jigs, intended to save both designing and tooling time, are described as to features and prices in a current folder from Franklin E. Smith & Associates.
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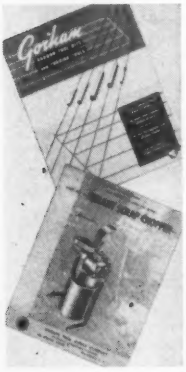


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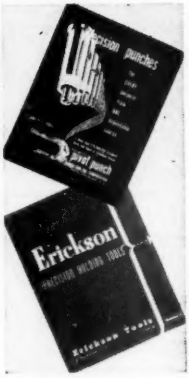


**WHEEL DRESSER**

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Three models of the Rotex Punch Press are pictured and described in a new brochure. A rotary turret "quick change" feature allows for versatile operation.
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### DIE CASTING

Details and specifications of the 1-lb. Zinc A B C Die Casting Machine are given in a current bulletin. This machine assures high speed production of top quality castings.
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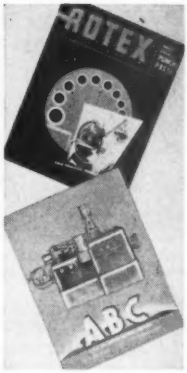


### WASHER DIES

A current circular discusses the economy method of making washers with Hovis Universal Washer Dies. A sectional line drawing shows the construction of these dies.
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Baumbach Catalog 50 is a comprehensive data book covering the company's line of precision-built, steel die sets and diemaking accessories. It's fully illustrated and well planned.
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### TRIMMING DIES

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### CENTERING REELS

Littell Automatic Centering Reels, described in Section 5-EE, are for holding coils of from 300 to 6000 lbs. Plain and motor driven reels are illustrated.
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### FABRICATOR

Punching, notching and nibbling can be done with the Wales Sheet Metal Fabricator, subject of 12-page Catalog 10-A. Design features are shown and specifications are detailed.
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### DIE SYSTEM

A 40-page booklet gives a full description of the Williams Universal Die System, an economical procedure for making short run dies for stampings.
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### FACE GRINDER

High speed production grinding of die blocks, pump housings, gear boxes and other parts can be done on the Rogers NT-20 Face Grinder. A folder tells the whole story.
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### ROTARY TABLE

Colorful Bulletin T-80 presents the Bellows Rotary Work Feed Table. Included are installation photos, dimensional drawings, specification data, wiring diagrams and descriptive text.
**Circle No. E22.**

### CARBIDE TOOLS

Useful "show-how" material is included in Kennametal's extensive, 72-page Catalog 51. It describes the company's complete line of tools and blanks.
**Circle No. E24.**

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Plastics, from page 104

The second phase of the tool making operations is more simple than the precise mechanical preparation of patterns and molds, but it must be carried out with as great attention to detail. Actually there is nothing involved but mixing the resin, pouring and curing it.

In mixing three components together there are two major factors: (1) mix thoroughly and (2) do not beat in air bubbles. It is necessary to mix the resin components completely, literally to the point of blending, in order to develop the best strength characteristics of the finished casting. The mixing should always be done mechanically, and with homogenizer equipment if possible. The use of an homogenizer in place of a conventional rotary mixer materially increases the quality of the casting. The tool will be more durable and more resistant to

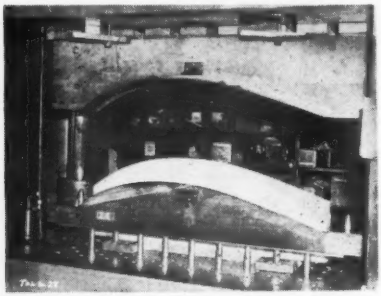

Fig. 9. Plastic draw die mounting.

dimensional changes.

A specific procedure should be followed in combining the ingredients of the mix. The stabilizer should be added to the raw resin slowly while the homogenizer is running to avoid mixing in lumps. When such a viscous mass as the combination of resin and stabilizer is agitated for a long time, there is usually some air beaten into the mix. Since the combination has a pot-life equal to that of the resin alone there is no harm in allowing the mix to stand for an hour or two before adding the accelerator. The standing time allows the occluded air to free itself from the liquid mass, preventing the possibility of an unsound,

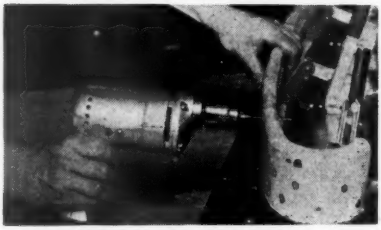

Fig. 10. Drill jig showing bushings that have been press-fitted in place.

bubble-filled casting.

When the material is to be poured, the accelerator is added in the proportions recommended by the manufacturer and carefully blended, again using the homogenizer, insuring complete dispersion of the acid throughout the resin-stabilizer mix. The function of the accelerator is to promote polymerization or hardening. Since the mass of the casting has an effect upon the amount of heat that is retained within it, the proportion of accelerator used varies with the size and section of the casting. Larger castings require relatively smaller amounts of accelerator because their mass helps to retain the heat supplied by its chemical action. The amount of accelerator used should be carefully worked out on an experimental basis before proceeding with large scale tooling operations. The advice of the resin

*(continued on page 113)*

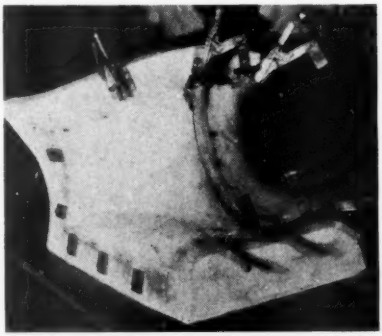

Fig. 11. Welding jig showing metal guard on seam of weld.

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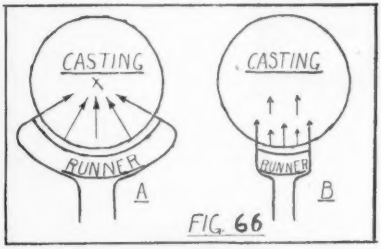
SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Die Casting, from page 78

Fig. 66A. Too wide a gate on a round casting can lead to the formation of entrapped air at the center of the casting where the molten metal ray breaks down, X.

Fig. 66B. A smaller gate may help to eliminate the defect that occurs in Figure 66A.




ally true in those cases where the die cavity is large and comprised of many narrow passageways.

The depth of the gate may or may not be held constant throughout its width. Frequently it is advisable to deliberately alter the depth of a gate throughout its width. This may be done in order to insure the flow of an equal volume of alloy through each point of the gate width, or the gate depth may be varied throughout its width to permit a greater flow of metal at one point than another.

The writers have always found it better to keep the depth of the gate constant and to vary the design of the feed and/or runner in order to establish either a uniform or non-uniform rate of flow. This depends upon which is the more desirable, i.e., either through any point of the gate or throughout its width. It should be noted, however, that a gate of constant depth is more readily trimmed than one of varying depth.

The width of the gate may range all the way from .075" to over 12"; however, great care must be exercised in the choice of the proper width, for frequently too wide a gate leads to many undesirable die casting defects. It is, however, better practice to increase the width of the gate rather than to over-increase its depth if a greater cross-sectional area is deemed necessary in order to permit a greater flow of metal into the die cavity.

It is best to start out, when breaking in a new die casting die, with a comparatively narrow gate, for the designer must guard against too much gate area. If additional gate area is found to be essential in order to obtain a die casting of the desired quality, the gate width may be easily milled in. This also holds for gate depth; it is best to begin with a shallow gate rather than one too deep, since the gate depth can always be increased by machining out more metal from the die, and because it is costly to make it more shallow by adding metal to the die.

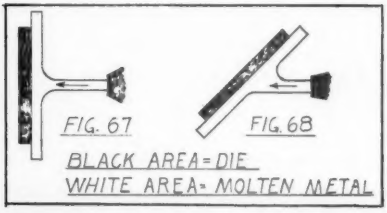



Fig. 67. Gate location which causes the molten metal jet to strike a flat die surface at 90° will cause turbulence and spatter. This design should be avoided.

Fig. 68. Locating the gate so that the molten metal jet strikes a flat surface of the die at a 45° angle is preferable.

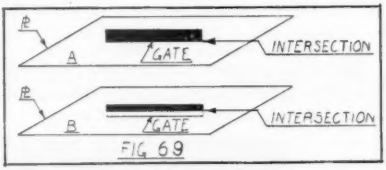



Fig. 69A. Parting plane of die passes through one edge of the gate plane.

Fig. 69B. Parting plane of the die passes through the plane of the gate.

While strictly speaking, the gate is a plane, whose cross-sectional area may be curved or flat. Thus, for example, when the die casting shape is that of a flat cylinder and the feed intersects the periphery of the cylinder, the gate follows the circumference of the cylinder, as shown in Figure 65.

The die designer must bear in mind that if he employs a wide gate in connection with a circularly shaped die casting, he runs the risk of creating unde-

*(continued on page 114)*

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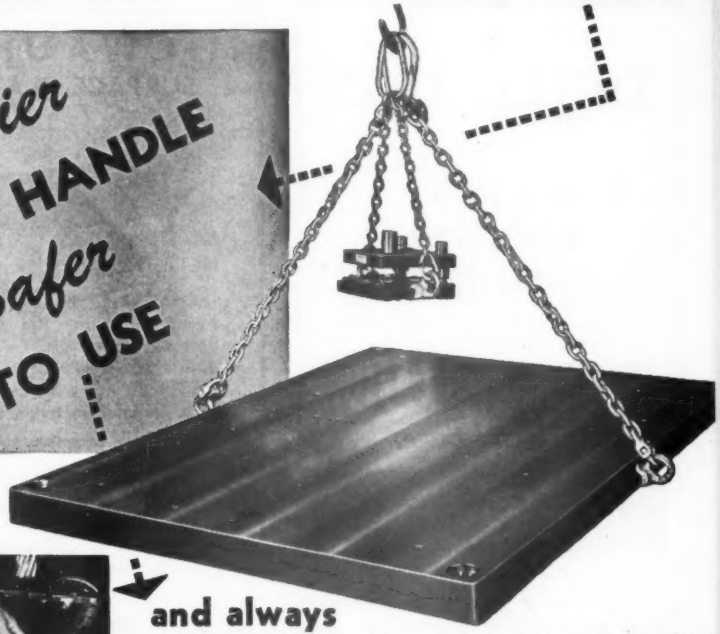

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. . . Plastics, from page 108

manufacturer should be solicited.

The acidic nature of the accelerator makes it necessary to have acid-resistant mixing equipment. Nickel or stainless steel is suggested. Personnel unfamiliar with acids should be educated in the precautions and first aid treatments that apply. No one need be anxious about the handling of the material if elementary care is taken.

Conventional core support consists of wooden bars attached to the cores, long enough to span the frame that encloses the mold. The cores are set in and the supporting members are fastened to the frame. The resin mix is poured in at one end of the mold and allowed to rise up in the other parts.

The curing operation has two stages. The first stage takes place in the open room at room temperature. During this, the accelerator provides the necessary heat to further polymerization. When a certain temperature and stage reaction is reached the casting tends to create heat itself. As the heat increases it promotes an exothermic reaction. The casting is left at room temperature for approximately eight hours to allow the heat generated by the accelerator and the consequent reaction to dissipate. The internal temperature of the casting should sustain itself at about 90 degrees C. After an eight hour room temperature curing period, the casting is placed in an oven.

This second stage of the curing operation requires additional heat for 16 to 24 hours in an oven that can be held at 90 degrees C. within two or three degrees. The closer the controls on the oven the more consistent will be the finished castings. An ideal oven is well insulated and equipped with an air circulation system that assures even temperatures throughout. Automatic temperature controls should be used. The maintenance of even temperatures by means of circulating the air within the oven is desirable.

*(continued on page 117)*

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. . . Die Casting, from page 110

sirable turbulence within the die unless he designs his runner and feed so that they cause the incoming molten metal to flow in one direction, Figure 66B, instead of normal to the plane of the gate, Figure 66A.

In regard to the proper design of the gate area, a few pertinent facts should be borne in mind:

(1) increasing the cross-sectional area of the gate while holding all other factors such as, (a) applied pressure on the injection plunger, (b) injection plunger area, (c) metal temperature, (d) die temperature, (e) metal density, (f) runner and feed design constant, has the effect of decreasing the time it requires to fill the die cavity with the molten die casting alloy; and

(2) increasing the cross-sectional area

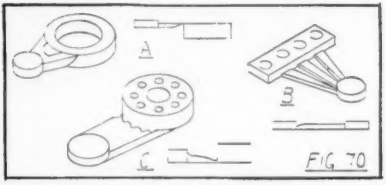


**Fig. 70. Three types of split runners to be avoided, although all of these are only too frequently employed.**

of the gate while holding all other factors constant has the effect of decreasing the applied pressure required to fill the die cavity with molten alloy in a given time interval.*

**Rule II: The Location.** The location of the gate, i.e., location in respect to the surface of the die casting, frequently has great bearing on the following:

(1) ease with which the feed may be sheared from the die casting proper;

(2) degree of the blemish left at the gate area on the surface of the die casting after the feed has been sheared off;

(3) ease with which the subsequent surface blemish may be polished off;

(4) manner in which the die fills;

(5) extent to which the incoming molten alloy jet welds itself to the die cavity surface onto which it impinges; and

(6) degree of turbulence of the molten die casting alloy within the die cavity during the interval of die filling.

*A complete discussion of the relationship of the gate to applied pressure and other factors can be found in: Erickson, James L., "The Role of the Injection Pressure in the Die Casting Process," METAL INDUSTRY, September 28, 1942.

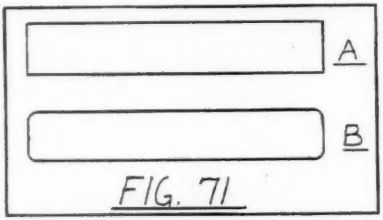


**Fig. 71. The corners of the gate cross-section should not be sharp as in A, but broken as in B.**

In general, the gate should be positioned so that the incoming molten alloy jet does not strike a flat die cavity wall head-on, as in Figure 67. It is always preferable to arrange the location of the gate so that the incoming molten alloy jet strikes the die cavity wall a glancing blow, as indicated in Figure 68.

The plane of die parting may either intersect the plane of the gate along one of its edges, Figure 69A, or it may not, Figure 69B.

It is preferable to have it intersect one edge of the gate area, for this facilitates the machining-in of the gate in the die casting die itself and makes for easier trimming of the subsequently produced casting.

**Rule III: Multiple Gates.** Multiple gates are to be avoided if at all possible; however, where it is essential to introduce molten die casting alloy into a die cavity at two points in order to assure

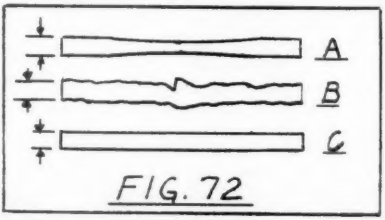


**Fig. 72. (A) Varying gate thickness. (B) Jagged gate edges. (C) Smooth parallel gate edges.**

*(continued on page 166)*

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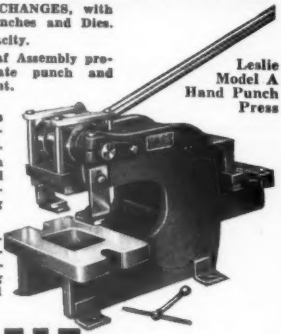
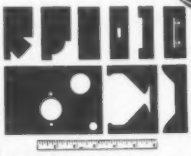


Leslie Model A Hand Punch Press

Diagram illustrates versatility of Press — each blanking done with 1 stroke.



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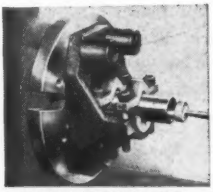

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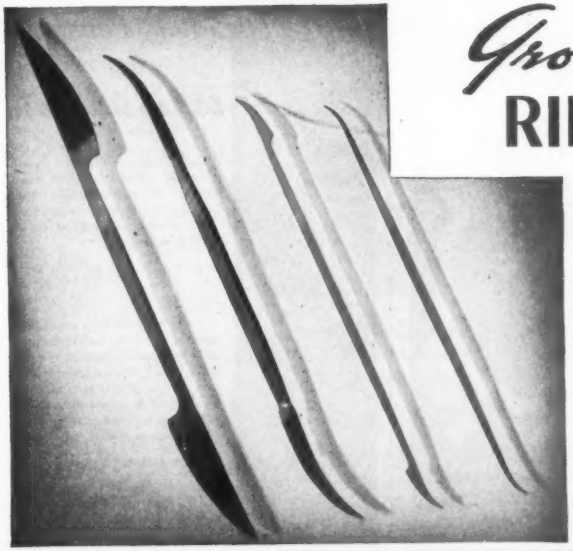

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

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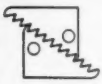

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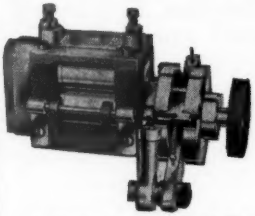

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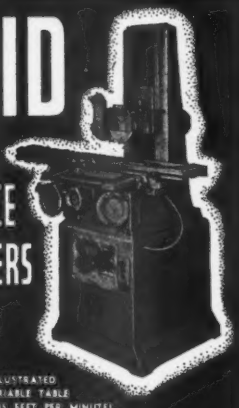

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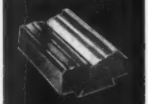

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. . . Plastics, from page 113

If the casting is large and the air temperature in the upper part of the oven is allowed to run higher than that at the lower levels (which would be a natural condition without circulation) the top of the casting will cure more rapidly than the lower parts. Accurate determination of the state of cure is thus impossible, since all calculations are based on inspection of the top surface. Evenly cured castings remain in excellent condition throughout their practical life.

Measurement of the extent of cure is a somewhat difficult matter for which to give precise data, unless a common method of measurement is used. A Rockwell hardness tester, using the "H" scale is the normal method of measurement in commercial production of cast phenolic. If a Rockwell tester is available, it can be used to give approximate checks on the progress of curing by periodically testing bars of the cast material that have been cast in simple cylindrical molds at the same time as the tool casting. Since the volume of these bars is not accurately related to that of the casting itself the results of these tests can be only approximate. If the same amount of accelerator is used for the bars as for the tool casting, i.e., if the bars are cast with the same material as the tool casting, they will tend to cure at a slower rate than the large casting because the heat generated within them is dissipated at a more rapid rate. Readings taken on the "H" scale should range between 10 and 30.

If the temperature of the oven is maintained as recommended, the casting, depending on its size and the amount of accelerator that has been used, should be fully cured in from 16 to 24 hours. For tooling work it is advisable to overcure the casting rather than take the chance of undercuring. The qualities of the surface are not impaired by moderate overcuring but will

*(continued on page 132)*

*Prominent manufacturer in electrical field reports 3,060,000 "hits" before first regrind.*

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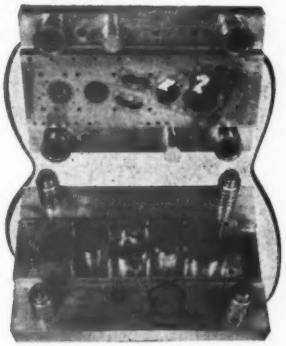

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# PUBLICATION

## Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

**Cincinnati Press Brakes.** their uses and essential features, are shown in a 72-page catalog issued by The Cincinnati Shaper Co. Fully illustrated in Catalog B2A are forming, corrugating, notching, punching and press work being done on these press brakes. Useful press brake die data are also included.
**Inform-A-Gram No. B1.**

**The Chromaster Industrial Hard Chrome Plating Unit** is featured in Ward Leonard Electric Company's Bulletin IC 20. Design highlights, precedure for use, and applications are some of the subjects discussed in this illustrated bulletin. WARD LEONARD ELECTRIC CO., Industrial Chrome Div., 31 South St., Mt. Vernon, N. Y.
**Inform-A-Gram No. B2.**


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**Inform-A-Gram No. B3.**

**A 44-Page Valve Catalog** has just been issued by Ross Operating Valve Co. The company's complete line of hundreds of standard models and modifications are described. Sectional views, installation data and diagrams are also included, together with a non-technical explanation of air valve operation and the difference between various types. ROSS OPERATING VALVE CO., 120 E. Golden Gate, Detroit 3, Mich.
**Inform-A-Gram No. B4.**

**The Vulcan-Draw Method** for inexpensively producing sheet metal corners with quick-change tooling is fully detailed in an informative editorial reprint now available. The Vulcan-draw press and its tooling are pictured and described. VULCAN TOOL CO., 730 Lorain Ave., Dayton 10, Ohio.
**Inform-A-Gram No. B5.**

# PREVIEWS

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**A Complete Line of Diamond Compound Accessories** is described in new Elgin literature. The accessories, to be used with Elgin DYMO Diamond Compound, include felt bobs and wheels, abrasive stones, polishing brushes, wood lapping sticks and wheels. They are especially selected for plastic molds, carbide dies, drawing and forming dies, and precision parts. Price List No. 303 gives detailed information. ELGIN NATIONAL WATCH CO., Industrial Products Division, Dept. T&P, Elgin, Ill.
**Inform-A-Gram No. B6.**

**The Ajax Salt Bath Brazing Process,** which makes it possible to substitute brass for copper and develop joints of adequate strength for most steel assemblies, is described in new Bulletin No. 124. Brass brazing is done at a lower temperature than with copper, which means that there is less grain growth, less distortion and no decarburization. AJAX ELECTRIC CO., INC., Frankford & Delaware Aves., Philadelphia 23, Pa.
**Inform-A-Gram No. B7.**

**"Di-Lifts,"** portable elevating tables for moving dies in storage and to and from presses, are the subject of a booklet published by Montgomery & Co., Inc. Besides the above applications, these tables can be used to support large overhanging pieces on drill presses, to transfer many types of work and for other jobs. MONTGOMERY & CO., INC., 53 Park Place, New York 7, N. Y.
**Inform-A-Gram No. B8.**

**The Magna-Vise** holds any metal or rigid nonmagnetic material firmly in place on your present magnetic chuck. It permits you to take advantage of magnetic chucking for brass, aluminum, copper, etc. Hanchett Magna-Lock Corp. is mailing detailed literature on the Magna-Vise.
**Inform-A-Gram No. B9.**

**The Protectron Damage Control System,** described in a current Brinnell Co. bulletin, is especially useful in decreasing die breakage and increasing die life between grinds. This bulletin describes the operation and advantages of the Protectron system and contains several application photos.
**Inform-A-Gram No. B10.**


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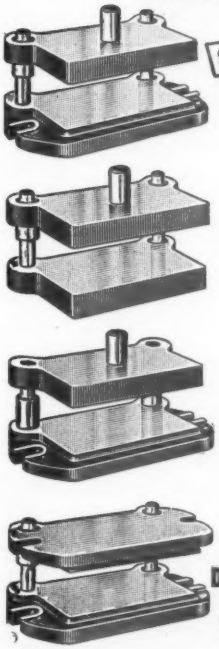

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**209 Lafayette St. • New York 12, N. Y.**


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

**"Superior" All-Steel Die Sets** feature the exclusive Lock-Jaw Lifting Device and E-Z Lift Sling Chain that makes it possible to move these die sets for any distance, in any direction. Complete details are given in current Bulletin No. 850.
**Inform-A-Gram No. B11.**

**The B & L Toolmakers' Microscope** is presented in Catalog D-22. This instrument allows you to make linear measurements to ± .0001"; angular measurements to ± 1 minute of arc, with protractor eyepiece.
**Inform-A-Gram No. B12.**

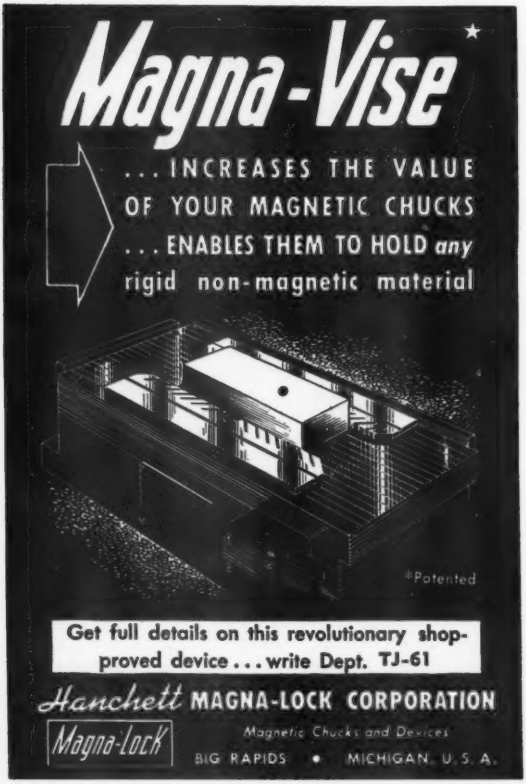
**The Jaco Reel** is an automatic, "no-snatch," horizontal stock reel that rotates at just the speed to suit the punch press feed. It will handle practically any resilient coiled material up to 6". Detailed literature can be procured from the manufacturer, Jaco Devices, Inc.
**Inform-A-Gram No. B13.**

**Leslie Model A Hand Punch Press** is the subject of a new, illustrated catalog. Besides describing features of the press, the catalog shows punches and dies available from stock.
**Inform-A-Gram No. B14.**

**Hydraulic Duplicator Catalog.** Turchan Followers are fully pictured and described in a newly issued booklet. Included are illustrations of various applications of the Follower together with a circuit drawing of a single dimension Turchan Follower in a typical application to a vertical mill. TURCHAN FOLLOWER MACHINE CO., 8259 Livernois, Detroit 4, Mich.
**Inform-A-Gram No. B15.**

**The Dodge Double Reduction "Torque-Arm" Speed Reducer Series** is covered in a cleverly prepared bulletin, No. A-470 A. In addition to clear illustrations of the product and its mechanism, the bulletin gives such comprehensive data in tabular form that anyone can quickly select the right reducer for any installation if he knows merely the horsepower required and the speed and size of the shaft to be driven. DODGE MFG. CORP., Dept. T&P, Mishawaka, Ind.
**Inform-A-Gram No. B16.**

**Verson Press Brakes** are equally adaptable to simple bending with runs of just a few pieces, and to the more complicated jobs. There is a Verson Press Brake for every need from 48" of 16 ga. steel up to long lengths of heavy plate. Descriptive literature giving design details and specifications is available.
**Inform-A-Gram No. B17.**



**Acro Pin Oilers,** die set pullers, drill rod racks and lubricators are described and pictured in the latest bulletin of Acro Metal Stamping Co. Acro Pin Oilers provide a cushion of oil between pin and bushing, result in an increase in production plus longer die life. The Acro Drill Rod Rack provides a convenient, time-saving method of storing drill rod. This bulletin contains complete descriptions, illustrations and prices. ACRO METAL STAMPING CO., 338 E. Reservoir Ave., Milwaukee 12, Wis.
**Inform-A-Gram No. B18.**

**Rimat Dial Bore Gages** are the subject of new Bulletin T-2. These gages measure diameters quickly and check taper and out-of-roundness in cylinder bores, "O" ring grooves, snap ring grooves, small bores and deep bores. Bulletin T-2 gives a complete description of these accurate instruments. RIMAT MACHINE TOOL CO., 1117 Air Way, Glendale 1, Calif.
**Inform-A-Gram No. B19.**

**Automatic Dial Index Feed.** Construction features that will enable you to increase production from three to six times with the "Speedex" are pointed out in a new de Castro brochure. Several applications are pictured and specifications are listed. DE CASTRO & ASSOCIATES, 1517 Santa Fe Ave., Los Angeles 21, Calif.
**Inform-A-Gram No. B20.**

**Design Data** on helical-wire thread inserts and the use of these inserts in the protection and repair of tapped holes are included in a 16-page, two-color bulletin offered by Heli-Coil Corp. Nine pages of tabular data give basic insert lengths, recommended drill sizes, roughing and finishing-tap specifications, and thread gages to be used when installing various sizes and types of thread inserts. HELI-COIL CORP., 47-23 Thirty-Fifth St., Long Island City 1, N. Y.
**Inform-A-Gram No. B21.**

**The Hammond 4" Abrasive Belt Grinder** can eliminate many costly hand filing, grinding, deburring and other operations. It can be used either horizontally or vertically. The manufacturer is mailing a descriptive bulletin on this grinder.
**Inform-A-Gram No. B22.**

**Inclinable Straight Side and Horning Presses** are featured in current Thomas Machine Mfg. Co. literature. Design features that make every Thomas press rugged and safe are pointed out.
**Inform-A-Gram No. B23.**

**Wesson's New Band Type Multicut Holder** is featured in Bulletin No. 511. Available in nine standard types and in 90 standard sizes, this tool holder is protected by steel bands replaceable at low cost.
**Inform-A-Gram No. B24.**

**Deep Throat Lever Punches** are highlighted in the latest Whitney-Jensen catalog. These extremely versatile punches have deep throats that facilitate working with large sheets.
**Inform-A-Gram No. B25.**

**A New Bulletin and Price List** on Emco power punch presses is offered by the manufacturer, Klaas Machine & Mfg. Co. These compact, powerful presses are built in two sizes with 5 and 10 ton capacity, respectively. They can perform up to 18,000 operations per hour.
**Inform-A-Gram No. B26.**

**Three Pieces or 10,000,** Federal "Controlled Tolerance," short run stampings guarantee quality. An illustrated descriptive bulletin has been issued.
**Inform-A-Gram No. B27.**

**The Strand Enclosure Safguard,** designed to protect the hands of press operators, is the subject of a new catalog sheet. This guard is easily adapted to accommodate various dies. A universal corner clamp, which holds both bars with only one screw, facilitates quick installation and adjustment. Gates can be tilted in or out. Staples can be removed to decrease size of guard, can be adjusted up or down and are held in position with screws. Transparent shields can be furnished at additional cost. STRAND MFG. CO., P. O. Box 762, Los Angeles 44, Calif.
**Inform-A-Gram No. B28.**

**Single and Double Action Presses** for rubber pad forming of aircraft parts are presented in new Bliss Bulletin No. 39. Rubber pad applications have been extended to true drawing operations by the use of a conventional hydraulic holding cushion in the bed of a single action press and a confined rubber pad on the slide of the press. This bulletin contains a complete description of the operation, together with schematic diagrams, photographs and specifications. E. W. BLISS CO., 1377 Raff Rd., Canton, Ohio.
**Inform-A-Gram No. B29.**

**Molykote Type G Bearing Pressure Grease** has as its basic lubricity ingredient a specially prepared and highly purified molybdenum disulphide compound that has excellent capacity to prevent metal-to-metal contact, and thereby counteracts galling and seizing at extreme bearing pressures. New Bulletin No. 53 tells the complete story. THE ALPHA CORP., Dept. T&P, Greenwich, Conn.
**Inform-A-Gram No. B30.**

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Wherever grooves, faces, chamfers, etc. are cut — whether internal or external — speed production, reduce costs on long runs
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AUTOMATIC RECESSING TOOLS
They do these operations on standard drill presses, radial drills, turret lathes and chucking machines, as well as on special machines. A single recessing tool is easily adapted to do various operations or a combination of operations. Adjustments regulating location and depth of groove are simple, fast and accurate. Types "J" and "C" pilot in a fixture bushing. Type "R" pilots in, and stops on the work.
Facing An Internal Boss On Motor Castings Where Obstruction Usually Causes Difficulty.
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WRITE FOR BULLETIN No. 10-50 showing types, sizes, specifications and prices.
YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

**All L & J Punch Presses** are described and illustrated in a current condensed catalog. These open back, inclinable presses are made in 12 models that range in size from 6 to 80 ton capacities, with the four larger sizes also available in back geared types. Complete specifications are given for every model and include fully dimensioned diagrams of the lower rams. L & J PRESS CORP., Dept. T&P, Sterling Ave., Elkhart, Ind.
**Inform-A-Gram No. B31.**

**Bearings, Bushings and Castings** are described in Bulletin No. 101 of Bronze Bearings, Inc. This colorful four-pager covers flanged type bearings, Babbitt lined bearings, graphited oil-less bronze bearings, bronze castings, plain bushings and stock bars, etc. This illustrated bulletin is obtainable from BRONZE BEARINGS, INC., 340-344 North Ave.-East, Cranford, N. J.
**Inform-A-Gram No. B32.**

**The Williams Universal Die System** is fully detailed in a 40-page booklet. A complete, illustrated description of this economical die construction method is given. The booklet contains a discussion of the three main units and assembly, together with instructions and prices. CONNECTICUT TOOL & ENGINEERING CO., 544 Iranistan Ave., Bridgeport 5, Conn.
**Inform-A-Gram No. B33.**

**Ex-Cell-O Carries** more than 300,000 drill jig bushings in stock. In addition to accuracy and long life, you get immediate delivery when you specify Ex-Cell-O Drill Jig Bushings. For a list of standard styles quickly available, get Ex-Cell-O Bulletin 35371.
**Inform-A-Gram No. B34.**

**Dickerman Automatic Punch Press Feeds** will enable you to handle very large volumes of production in your press room without any increase in floor space. An up-to-date catalog describes seven models that mount on any die or press.
**Inform-A-Gram No. B35.**

**The Froom Load Centering Eye Bolt** allows safe lifting of heavy dies, tools, machinery, etc. Descriptive literature has been published by the manufacturer.
**Inform-A-Gram No. B36.**

**A 16-Page Bulletin** provides full information on Dumore drill heads. These high-speed units have drill feed, speed, pressure and stroke automatically controlled. Gang operation and remote control foot switch step up production.
**Inform-A-Gram No. B37.**

**"Die-Co" Die Springs** are specially designed for greater travel, pressure and endurance. The Die Supply Co. is distributing Spring Bulletin No. 403 covering nearly 500 stock sizes.
**Inform-A-Gram No. B38.**

with

Tannewitz HIGH SPEED BAND SAWS

IT'S THE FASTEST, MOST ECONOMICAL MEANS OF CUTTING METAL AND MANY OTHER MATERIALS

There's a revelation in store for you if you have never tried friction sawing with these machines. Flat sheets of either soft or hardened steels, non-ferrous materials can be sawn in a fraction of the time required by other methods. Cutting armor plate and other materials is not impractical, and for cutting formed parts there's nothing that compares with it. Cuts are smooth and down-drag of saw is so minor that no rest of any kind is needed. Write for your free copy of "FRICTION SAWING", Now!

*For trimming castings of all types of metals our variable speed band saws are real production expediters. Write for bulletin.*

SAWING MACHINERY SPECIALISTS

THE TANNEWITZ WORKS
GRAND RAPIDS, MICH.


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

**How Time Savings Exceeding 50%** are effected by automatic radial and longitudinal feed in gear hobbing is described in a six-page folder on the Type 75 Semi-Automatic Gear Hobbing Machine, developed by S. Lambert S.A., Soleure, Switzerland. Copies can be had from the U. S. representative, CARL HIRSCHMANN CO., 30 Park Ave., Manhasset, N. Y.
**Inform-A-Gram No. B39.**

**Complete Information** and specifications on Airtherm 1500 and 2000 series all-steel power press brakes ("Metalworkers") are given in current Bulletin 906. These press brakes are for heavy sheet metal and light plate work. AIRTHERM MFG. CO., 775 S. Spring Ave., St. Louis, Mo.
**Inform-A-Gram No. B40.**

**R-B Punches, Dies, Retainers** and other diemaking parts are fully covered in Allied Products Corporation's colorful, 48-page catalog. These punches and dies are stocked in standard sizes, shapes and materials for immediate delivery.
**Inform-A-Gram No. B41.**

S&E
TUNGSTEN CARBIDE
ROTARY CUTTERS
PRECISION TOOLS FABRICATED TO EXACTING STANDARDS
• Heads are completely form ground concentric with shanks and are fully form cutting — no "dead spots."
• Ten standard shapes in 1/8", 1/4", 3/8" and 1/2" diameters. Special sizes and shapes to your specifications.
• Custom resharpening. Prompt service at nominal charge.
WRITE FOR NEW ILLUSTRATED BULLETIN NO. 103
S&E MACHINE PRODUCTS, INC.
Sales Offices in Principal Cities
Plant and General Office: Bridgeport, Mich.

**A Specially Prepared Case History** presents the solution to a costly quench oil consumption problem at International Harvester Co., Fort Wayne Works. This bulletin explains and illustrates, with charts and photos, Fort Wayne's new quenching method, "mass marquenching" of gears, shafts and other parts; shows how installation of Honan-Crane Oil Purifiers has enabled them to safely use quenching oil three times as long in this particular operation. HONAN-CRANE CORP., 208 Indianapolis Ave., Lebanon, Ind.
**Inform-A-Gram No. B42.**

**Elmes Hydraulic Metalworking Presses** are covered in 12-page Bulletin No. 1010-B. Electric control provides semi-automatic operation, automatic operation and inching, with speed change and reversal of slide governed either by ram travel or pressure, whichever is preferable. AMERICAN STEEL FOUNDRIES, Elmes Engineering Div., Dept. T&P, Cincinnati 29, Ohio.
**Inform-A-Gram No. B43.**

**Western Two-Speed Transmissions** are used to supplement constant-speed and multi-speed motors in order to provide broader speed ranges and special ratios that are not obtainable electrically. An illustrated catalog on these transmissions is offered by WESTERN MFG. CO., 3400 Scotten Ave., Detroit 10, Mich.
**Inform-A-Gram No. B44.**

**The AH Portable Tester** can be used for testing the hardness of metals and for testing properties of other materials. A new pamphlet describes its features, pictures the proper operating steps and gives other instructions for using this instrument. THE AH CO., INC., Dept. T&P, Brighton, Mich.
**Inform-A-Gram No. B45.**

**Towmotor's Unloader for Handling Dies** is pictured in a colorful new engineering folder. This truck carries heavy dies to and from the die table of a press. The die is deposited on the table by extending the pusher plate of the hydraulic Unloader. Other special-application trucks, tractors and accessories are also described and illustrated in this folder. TOWMOTOR CORP., 1226 E. 152nd St., Cleveland 10, Ohio.
**Inform-A-Gram No. B46.**

**Ingenious Drilling and Shaping Applications** are among the interesting operations involving Delta equipment that are shown in the latest issue of the company's Power Tool Journal. T&P readers can get their names on the mailing list for this informative publication by writing to DELTA POWER TOOL DIV., Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee 1, Wis.
**Inform-A-Gram No. B47.**

**Carboloy's Valuable Die Engineering Manual D-124** consists of 36 pages of information intended to assist designers and manufacturers in applying Carboloy Cemented Carbide to dies and punches. It gives all the facts on how to finish and service vital carbide sheet-metal dies for longer die life, fewer rejects, better finishes, closer tolerances and lower costs.
**Inform-A-Gram No. B48.**

**The Hercules Interchangeable Punch System** for stamping operations is described in comprehensive, Whitman & Barnes Catalog No. 103. Advantages of this system include lower die building cost, easier and quicker setups, reduced downtime for die repairs, and lower die maintenance cost.
**Inform-A-Gram No. B49.**

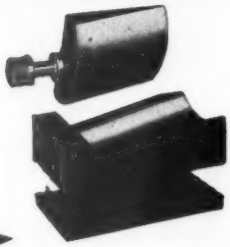
**Lucifer Electric Heat Treating Furnaces.** Series 7056 V double-duty furnaces were designed for those industries where it is necessary to heat treat relatively long, slender pieces with the minimum of warpage. Complete details, including standard characteristics, accessories and prices, can be found in a new catalog sheet. GILBERT S. SIMONSKI CO., 401 N. Broad St., Philadelphia 8, Pa.
**Inform-A-Gram No. B50.**

**The Ingersoll Cutter Grinding Manual,** newly revised, tells you how to get longer tool life from your Ingersoll Milling Cutters; more production from your Ingersoll Cutter Grinder. Much valuable technical information is included.
**Inform-A-Gram No. B51.**

**Designed to Speed Pattern, Die and Mold Finishing.** Haskins HS-4 Flexible Shaft Equipment assures quality production. New literature describes Haskins' complete line of machines and attachments for all grinding, sanding, filing and polishing operations.
**Inform-A-Gram No. B52.**


NEW *Empco JACK* Gives you Quick Accurate Machine Leveling and it ABSORBS *VIBRATION*

New type JACK greatly reduces noise and vibration with VI-SORB Mounting Pads.



VI-SORB Mounting Pads

The combination of a new Empco Jack and VI-SORB is a long step forward in setting and keeping power-driven equipment level while combating the destructive forces of vibration.

Empco Jacks are self-aligning to give you the quickest, easiest, most accurate machine leveling ever known.

For precise machine leveling and maintenance you will save time and money if you use Empco Jacks with VI-SORB Mounting Pads. Write for complete information and prices today!

Remember: A level machine—kept on the level—does better work and lasts longer.

EMPCO PRODUCTS

THE ENTERPRISE MACHINE PARTS CORPORATION
2735 JEROME AVENUE • DETROIT 12, MICHIGAN

**Height Gages and Flush Pin Gages** are now available from Scully-Jones for pre-setting drills, taps, reamers and other cutting tools that have been inserted in adjustable adapters before being placed in machine spindles. These gages will reduce setup time as much as 80% on multiple-spindle and transfer-type machines. Complete details can be found in new literature issued by SCULLY-JONES & CO., 1913 S. Rockwell St., Chicago 8, Ill.
**Inform-A-Gram No. B53.**

**A New Force Indicator Bulletin,** released by Hunter Spring Co., includes engineering specifications on all 12 models of the Hunter Indicator. This precision instrument is used for accurate force measurement in design, research, production, inspection and maintenance. Operation of the instrument, types of loads measured, typical applications, accessories and use of the six attachments are also covered. HUNTER SPRING CO., Dept. T&P, Lansdale, Pa.
**Inform-A-Gram No. B54.**


STRAIGHTEN COIL STOCK
FOR PRESSES, SHEARS OR SLITTERS

WITH
LITTELL Variable Speed STRAIGHTENING MACHINES

Output rises, costs drop when coil stock is fed to the press, the shear, or the slitter through a Littell Straightening Machine. Coil stock comes out of a Littell Straightener flat, with curvature removed. Equipped with variable speed transmissions, Littell Straighteners are easily adjusted to meet a wide range of speed requirements. Thirteen medium and heavy duty models straighten coil stock of all standard widths and thickness.

F. J. LITTELL MACHINE CO.
WRITE FOR CATALOG
ROLL FEEDS • DIAL FEEDS • STRAIGHTENING MACHINES • REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland
4197 N. RAVENSWOOD AVE. • CHICAGO 13, ILL.


**A Complete Manual on Flame Failure Protection** for industrial applications is "Protectoglo Combustion Safeguard for Industrial Gas-Fired and Oil-Fired Burners," Catalog 9601, issued by Minneapolis-Honeywell Regulator Co. Information on the new "flame-rectification principle" of operation, descriptions of the many types of system components, and installation drawings are included. MINNEAPOLIS-HONEYWELL REGULATOR CO., Industrial Div., Wayne & Windrim Aves., Philadelphia 44, Pa.
**Inform-A-Gram No. B55.**

**The Boeckeler Optical Follower** is a duplicating instrument that embodies a streamlined method of doing precision hole spacing work. Specifically designed for knee-type milling machines, the optical follower actually converts these machines into high-efficiency jig borers. A descriptive folder is now obtainable from BOECKELER INSTRUMENT CO., 31 E. Rillito St., Tucson, Ariz.
**Inform-A-Gram No. B56.**

**An Efficient and Accurate Die Filing and Sawing Machine** is offered in four new models by Harvey Mfg. Corp. A four-page folder fully describes all of these new models and a special sawing attachment that is available. Write to HARVEY MFG. CORP., 161 Grand St., New York, N. Y.
**Inform-A-Gram No. B57.**

**Time-and-Money-Saving "Supeream" Stop-Pins** and Finger Stops are described in a four-page circular of Twentieth Century Mfg. Co. Stop-pins are completely self-contained units that hold securely in stripper plate. All sizes have 1/32" wall, permitting insertion close to die or punch.
**Inform-A-Gram No. B58.**

**"There's An Erickson Answer to Every Holding Problem"** is the theme of new Catalog "J" covering a complete line of precision holding tools. Some of the sections included are: Precision Collet Chucks, Adjustable and Full Floating Holders, Precision Tap Chucks, Speed Indexers, and Boring and Reaming Tools. ERICKSON TOOLS DIV., 2314-D Hamilton Ave., Cleveland 14, Ohio.
**Inform-A-Gram No. B59.**

**Cutting Tool Price and Stock List.** Illinois Tool Works has issued a 44-page, completely illustrated booklet on their standard cutting tool line. The stock list provides buyers with exact inventory information on quantities available for immediate delivery. All prices are printed in color to facilitate discount reference. ILLINOIS TOOL WORKS, 2501 N. Keeler Ave., Chicago 39, Ill.
**Inform-A-Gram No. B60.**

**"Detroit" Standard Die Sets** are Micro-metric jig-bored and machined to exceptionally close limits of parallelism, flatness and squareness with the guide-pin axis. This precision reduces strain warping and results in longer die life and long, uninterrupted production runs. Complete details and literature can be had from Detroit Die Set Corp.
**Inform-A-Gram No. B61.**

**Zero Backlash Miniature Speed Changers** are featured in Metron Instrument's Technical Data Sheet No. 7. This literature describes the purpose of the speed changers, principle of operation, friction and roughness, effects of high ratio, and required output and spring wind-up. METRON INSTRUMENT CO., 432 Lincoln St., Denver 9, Colo.
**Inform-A-Gram No. B62.**

**Wittek Roll Feeds** are presented in a detailed catalog. These roll feeds handle any type of coiled strip stock and are made in single roll, double roll and compound types with straighteners, in models to feed in any of four directions. The catalog describes standard sizes and models to meet a wide variety of press size and capacity conditions.
**Inform-A-Gram No. B63.**

**Newly-Introduced Wales Drilling Machines** are the subject of Catalog DM. They perform precision locating, drilling and reaming of holes in material of practically any length up to 36". Catalog DM is fully-illustrated and functionally-colored.
**Inform-A-Gram No. B64.**

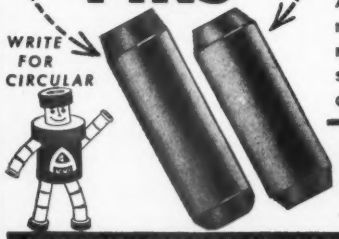
**J.I.C. Hydraulic Power Units.** New catalog sheets contain installation drawings and data on the new Vickers line of power units constructed in accordance with recommended J.I.C. Hydraulic Standards for Industrial Equipment. VICKERS INC., 1450 Oakman Blvd., Detroit 32, Mich.
**Inform-A-Gram No. B65.**

STOP
aking your own punches
WE'LL MAKE ANY PUNCH AT A PRICE BELOW YOUR OWN COST!
pivot punch
ecision punches
for EVERY purpose from ONE dependable source
pivot punch
● No Need to Stop to Standardize. 276,000,000 sizes and styles at standard catalog prices. No hidden prices for "in-Between" Sizes.
● Any Type of Punch in a Choice of Four Qualities. A punch for every purpose — a punch for every cost at prices below your own cost to manufacture.
SEND FOR NEW FREE CATALOG. WRITE DEPT. I
ONE SOURCE FOR ALL OF YOUR PUNCHES
pivot punch

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

USE
ACME
RED OR BLUE LABEL
PRECISION
DOWEL
PINS

WRITE FOR CIRCULAR



SAFEGUARD
EXPENSIVE DIES AND MACHINE PARTS

Acme Dowel Pins break before bending or mushrooming—thus saving expensive equipment from ruin through misalignment. Order standard sizes from stock. Attractive prices on special sizes and large quantities.

Acme Industrial Company
Makers of Standardized Jig & Fixture Bushings
206 N. LAFLIN ST. CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

441 STANDARD SIZES OF MARSHALL STEEL PRECISION GROUND FLAT STOCK

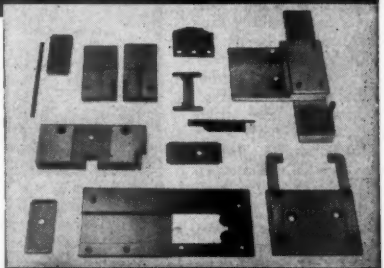
The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.

OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.

AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. Dept. TD

Write for descriptive literature, catalog of sizes and prices.



MARSHALL STEEL CO.
LA GRANGE, ILLINOIS

The Aristocrats of Ground Tool Steel

**Ring Piercing Punches and Button Dies.** Complete details, together with stock size specifications and prices on this new line offered by Producto Machine Co., are contained in a current bulletin. Ring Button Dies are made with tapered hole to avoid jamming and expensive down time. Ring Punches are designed to afford economy and ease of installation. PRODUCTO MACHINE CO., 970 Housatonic Ave., Bridgeport, Conn.
**Inform-A-Gram No. B66.**

**Industrial Cleaning Machines,** chemicals and accessories are presented in a new two-color catalog published by L & R Mfg. Co. Covered in this catalog are small parts cleaning machines, cleaning and rinsing solutions, flexible shaft equipment, polishing motors, crystal cements, mallets and hammers and rust remover. L & R MFG. CO., 577 Elm St., Arlington, N. J.
**Inform-A-Gram No. B67.**

**Punches and Dies** are some of the distinctive applications of Kennametal (carbide) pictured in the latest complete catalog of this manufacturer. In addition, Catalog 51 contains many useful design suggestions, grinding recommendations and machining hints in its 72 pages. KENNAMETAL INC., Dept. T&P, Latrobe, Pa.
**Inform-A-Gram No. B68.**

**Specifications** of an entirely new line of Darra-James Drill Presses are given in Bulletin D. P. 51, published by Toolkraft Corp. These streamlined drill presses are made in single spindle and multiple spindle, standard and production models. TOOLKRAFT CORP., Dept. T&P, Springfield 1, Mass.
**Inform-A-Gram No. B69.**

**The Deward Blue Sheet** contains full information on the physical properties and characteristics of Deward Tool Steel, and best methods of handling and treatment. This Allegheny Ludlum oil-hardening tool steel can be used to advantage wherever specifications call for hardened machine parts in precision work.
**Inform-A-Gram No. B70.**

**Style "B" Danneman Precision Die Sets** are designed for light work on small power presses where extreme accuracy counts. Complete features and stock sizes available can be found in literature issued by Danneman Die-Set Div., Acme-Danneman Co., Inc.
**Inform-A-Gram No. B71.**

**DI-ACRO Benders,** brakes, shears, rod partners, punches and notchers are presented in O'Neil-Irwin's latest, 40-page "Die-Less Duplicating" Catalog. This catalog points out their many applications for experimental work and speedy production of duplicated parts.
**Inform-A-Gram No. B72.**


WORN and OBSOLETE CUTTERS RECLAIMED

*at low cost*

*Typical National Salvage Job*

**High Speed and Carbide Service**

**Let us show you how your cutting tool costs can be reduced by an organized salvaging program. We also manufacture carbide tipped drills for producing holes and centers in hardened steel (up to 66-C).**

**Representatives in all industrial areas.**

*National* **TOOL SALVAGE CO.**

**6511 Epworth Detroit 10, Mich.**

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# MILITARY AND INDUSTRIAL PRODUCTION NEWS

**Steel Founders' Society of America** is pushing a national conservation drive to help alleviate the critical supply situation in iron and steel scrap. Urgency of the scrap drive is being stressed in a series of direct mail bulletins to producers, suppliers and customers of the industry. Pointing up the seriousness of short scrap supply, the Society literature warns that "unless the flow of scrap is greatly increased, we may have a repetition of 1941, when some melting capacity was shut down due to lack of scrap."

**The Chicago Branch Office and Warehouse** of Latrobe Electric Steel Co. has been moved to newly built quarters at 2006 N. Hawthorne Ave., Melrose Park, Ill. District Manager F. E. Allison continues in charge. Approximately 9000 square feet of floor space has been efficiently arranged to facilitate customer service. New material handling equipment has been installed to provide more rapid handling of incoming and outgoing stocks.

**New SPS Sales Officials.** Two promotions in the inside sales force of Standard Pressed Steel Co., Jenkintown, Pa., have been announced by J. Whiting Friel, vice president in charge of sales. C. W. Hollingsworth, former manager, UNBRAKO Socket Screw Division, becomes divisional sales manager, heading up the UNBRAKO Socket Screw, FLEXLOC Lock-Nut and HALLOWELL Steel Collar Divisions of the company. Raymond N. Gruber succeeds Mr. Hollingworth as manager, UNBRAKO Socket Screw Division.

**Manpower Supply Division.** The Secretary of Defense has directed that the functions of the Munitions Board that relate to manpower, industrial relations and labor supply be transferred to the Office of the Assistant Secretary of Defense, Anna M. Rosenberg. To handle this work, a new division, to be known as the Manpower Supply Division, has been formed. Russell C. McCarthy of Rochester, N. Y., will head the newly created division.

**J. K. Smit & Sons, Inc.,** of Murray Hill, N. J., manufacturers of industrial diamond products, announce the election of Pieter Smit as president. Mr. Smit, who until recently was secretary-treasurer, is the third generation of his family to take an active interest in the leadership of the company. Johan J. Smit, Sr., continues as chairman of the board.

**E. A. Baumbach, Jr.,** recently became president of E. A. Baumbach Manufacturing Co., 1810 S. Kilbourn Ave., Chicago 23, Ill. The company is a leading producer of die sets and diemakers' supplies.

**Defense Insurance Plan.** A national defense "projects rating" insurance plan, which is expected to reduce materially the insurance costs on government contracts, has been approved by the Munitions Board. It embodies basic principles used in World War II and provides for workmen's compensation, automobile and general liability insurance to all military contractors. A fact sheet on the plan is available from Industrial Services Branch, Office of Public Information, Office of the Secretary of Defense, Room 2A858, The Pentagon, Washington 25, D. C.

**Philip R. Marsilius,** vice president and secretary of The Producto Machine Co., Bridgeport, Conn., and president, The Producto Corp., Detroit, has been named Chief of the Tool, Die and Fixture Section, Machinery Division, National Production Authority. Mr. Marsilius is also a trustee of the National Tool and Die Manufacturers Association, and president of the Southern Connecticut Tool and Die Manufacturers Association.

**Carl Hirschmann Co.,** 30 Park Ave., Manhasset, N. Y., has been appointed exclusive U. S. representative for Thommen, S.A., Waldenburg, Switzerland. Thommen thread rolling machines and precision thread rolling dies will be imported for the American market and will be stocked here by Hirschmann. Factory service and parts will be available from Manhasset.

**Ex-Cell-O Corporation's** new officers include the following men: Phil Huber, chairman of the board of directors; H. Glenn Bixby, president and general manager; James K. Fulks, executive vice president; Milton B. Montgomery, vice president in charge of manufacturing; Earl E. Conlin, secretary and treasurer; and Donald N. McPherson, assistant secretary.

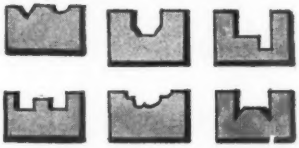
**Fifteen Members** of the Industrial College of the Armed Forces, one of several groups touring the nation to make first-hand studies of America's industrial strength, recently visited the Pratt & Whitney Division of Niles-Bement-Pond Co. at West Hartford, Conn. P&W was selected because it was considered representative of the machine tool and gage industries in the Northeast.

**Diamond Machine Tool Co.,** 3429 E. Olympic Blvd., Los Angeles, Calif., has just appointed Gene Heller to direct its sales and advertising. The company manufactures a broad line of punch presses, milling machines, power squaring shears and kindred tools.

# NEWFIELD

## UNIVERSAL FLY CUTTER

Above: FACE MILLING



ABOVE—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individual adjustable bit holders permit slots of any shape to be cut 3/16" to 2" wide.

### STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION

*For* many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The Newfield fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10".

***Write today for details of this versatile, production-upping, money-saving tool.***

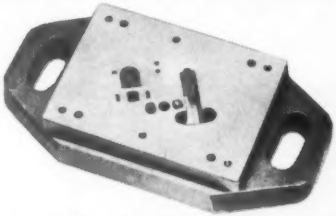
**NEWFIELD MACHINED PARTS CO.**
210 W. Seventh St. . .Los Angeles 14, Calif.



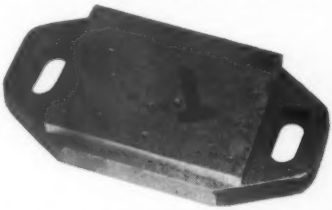
# THAT PHOENIX BRAND
TRADE MARK REG U.S. PAT OFF
## HEAT TREATING COMPOUND WORKS LIKE MAGIC!

**SAVES MONEY, SAVES HOURS OF COSTLY POLISHING TIME AND ELIMINATES PITTING, SCALE AND DECARBURIZATION!**

DIE AFTER HEAT TREATING—USING PHOENIX BRAND COMPOUND.



DIE AFTER ORDINARY HEAT TREATING — NOTE: SCALE, PITTING



Applied as a dry powder — simple, easy to use — *not a salt solution. Send for trial* order or write for complete information.

2 lb. can — $ 6.00
5 lb. can — 15.00
15 lb. can — 41.25
25 lbs. or more — $2.50 per lb.

**AT YOUR MILL SUPPLIER—OR WRITE**

**THE PARKER STAMP WORKS, Inc.**
Established 1871
HARTFORD, CONNECTICUT


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Plastics, from page 117

not come up to desired strength and hardness if undercured.

Finishing work on the tool surfaces is not always necessary. When pattern and mold have been carefully surfaced, the tool surface will also be smooth and true. A finish coating of wax buffed with an unsewn cloth buff gives a final polish that aids forming operations.

If it is necessary to modify the surface of the casting to meet changes in tooling, material can be readily added to the tool in a matter of minutes. The surface of the tool is roughened and a plaster or clay dam is built up around the spot to be altered. The casting mix, identical to the original mix with perhaps a greater amount of accelerator, is poured and cured with a near-infra-red lamp. The dam is broken away and the new surface developed with file and sand paper.

Dies are prepared for the press with a wooden pad at the base. The pad may be made up of layers of plywood or lumber. It serves as a cushioning and leveling device, protecting the edges of the tool base and allowing shims to be inserted without danger of damage. The required tapped holes for mounting the pad, for assembling jigs and checking fixtures or for mounting adapters on spinning chucks, can be drilled and tapped directly into the plastic without need for inserts. Large, full bodied threads are recommended. All holes should be drilled well away from the edges of the casting.

Plastic tools can do a good job if they are made correctly and applied with knowledge of their limitations. Many tooling needs can be filled with greater economy and speed. The plastic tool merits investigation by all manufacturers and specialists who fabricate sheet metals or sheet plastics, who make models and patterns, and who have need of a cost cutting, time-saving tooling process.

• Thousands upon thousands of Zagar collets, holding and indexing fixtures called into service before World War II began are still performing most profitably. *Advantages:* No vertical movement of collet. Chips self-clearing. Close tolerances. Top production with extreme accuracy. For slot milling, straddle milling, drilling, tapping, grinding.

*Ask for our Catalog T-6*

**ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.**

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

## Defense Production Loan Guarantees

The Defense Production Act and Executive Order 10161 give the Army, Navy and Air Force (along with several other departments of the Government) the authority to guarantee working capital loans by private banks to contractors where this is necessary to obtain essential production.

The loan guarantee system under this authority is substantially the same as the V-loan program of World War II which operated under Executive Order 9112 of March 26, 1942.

Actual loans under the system are made by private banks. The Army, Navy and Air Force guarantee the banks against loss, on a fixed percentage of each loan, as agreed in each case. Financing under the system makes possible a greater use of private banking funds than would normally be possible because of the reduction of risk.

The Army, Navy and Air Force loan guarantee programs follow uniform policies and procedures. These insure that all guarantee operations will be conducted in the same manner. As a basic policy, such guarantees will be given only where the production or service is essential, and where no alternate source of performance is readily available. In other words, guarantees will be given only where the Government will receive the chief benefit.

The Federal Reserve Banks are the fiscal agents of the guaranteeing agencies for the issuance of guarantees and the general administration of the program. The Board of Governors of the Federal Reserve System supervises the operations of the Federal Reserve Banks, regulates interest rates, guarantees fees and other charges that may be made on guaranteed loans.

A fact sheet containing details of procedure, charges, etc., can be had from Industrial Services Branch, Office of Public Information, Department of Defense, Washington 25, D. C.

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FOR LESS THAN $150
IN PRECISE MOUNTS ON LATHES AND OTHER MACHINE TOOLS, PRECISE GRINDER-MILLERS WITH 1/4 H.P. AND SPEEDS FROM 20,000 TO 45,000 R.P.M. DO THE WORK OF SINGLE-PURPOSE MACHINES COSTING 100 TIMES AS MUCH!

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ATTACHABLE COOLFLEX SHAFT (optional). Quickly attached for bench work and handtool applications. Same speeds, same precision quill as in PRECISE GRINDER-MILLERS.
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PRECISE GRINDER-MILLERS

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

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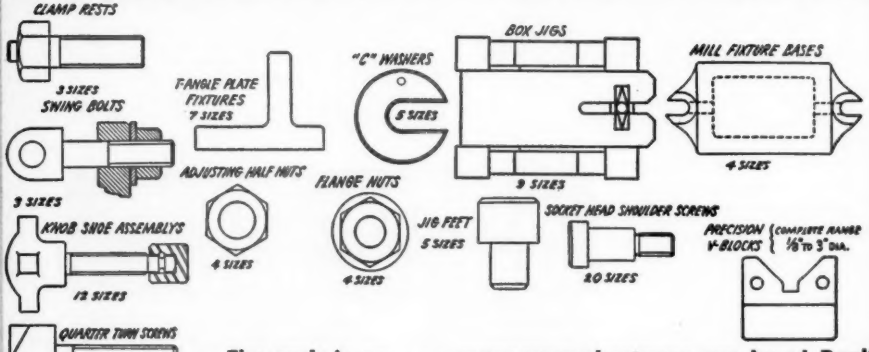
## OF YOUR DESIGNERS AND TOOLMAKERS!

## USE NOBLE & STANTON STANDARD JIG AND FIXTURE PARTS




**The rush is on . . . manpower shortages are here! Don't waste the valuable time of your designers and toolmakers in custom-building jig and fixture components.**

**Now is the time to use Noble & Stanton *Standard* Jig and Fixture Parts. Adopt them as standards in your plant. They're the best you can buy—are tough and durable—will never fail on the job—can be used over and over again.**

**Noble & Stanton Components are precision made from quality steels. NS parts are turned from solid stock—not welded or brazed. They're heat treated and hard chrome plated wherever practicable.**

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. . . Trade Assoc., from page 86

district meetings or by special bulletins, manuals and reports, particularly as applied to the first two questions.

Some of the associations interpret and reproduce any new government regulations for the benefit of their members.

The associations covering industries in which there is a shortage of skilled labor are active in getting greater consideration of draft deferment requests and fairer regulations from the Wage Stabilization Board.

Surveys have been made by some of the associations in the special tooling industry covering facilities and the types of special tools made. The compiled data have been turned over to the Munitions Board which is preparing a directory from them.

In the last war, because the importance of one industry's products was misunderstood, a serious bottleneck was created in the production of military vehicles, tanks and landing craft. In the interest of gaining recognition for the importance of this industry, a four-page folder was prepared by the Association giving the facts about the industry so that all concerned would have a full understanding of the part played by this industry on the home front and for the military services. Member companies were furnished a supply of these folders and it is anticipated that this folder will be attached to applications for draft deferment whenever a key employee in a critical operation is being considered for induction.

The technical department of this association has released two technical manuals which will be of immediate use in the defense effort. One of them covers all metallic and nonmetallic coatings and describes ways to conserve critical alloys by suitably coating them to meet various applications.

Procedures for obtaining government business do not interest all metalworking industries. Some have a 20 to 24 month backlog of orders. Their urgent needs are a blanket priority with which to get materials, help on manpower and some easy way by which to borrow

ELGIN DYMO
diamond compound

Tested and proved by hundreds of industrial users on plastic molds, carbides, drawing dies, precision parts, and cutting parts.

DYMO finishing will reduce finishing and polishing time in your shop and give you mirror finishes every time. Write today for free demonstration—proof of DYMO FINISHING advantages.

INDUSTRIAL PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

money to cover swelling inventories and to buy the equipment required to increase their output.

Practically all the associations indicated that by some means or other, they are taking an active interest in all phases of mobilization, including manpower, materials, price control, wage stabilization, and some have cooperated in the appointment of industry advisory committees in NPA and for OPS.

The associations responding to the questions were: Compressed Air and Gas Institute; Gray Iron Founders' Society, Inc.; Industrial Diamond Association of America, Inc.; Malleable Founders' Society; National Machine Tool Builders' Association; National Screw Machine Products Association; National Tool & Die Manufacturers Association, and Pressed Metal Institute.

★ ★ ★

**Movies for Industry**

General interest films are now available from the Department of Defense for non-profit public showings. Sixteen mm sound prints of the following films may be booked for non-admission showings: "Your Air Force in Action," "Crime of Korea," "Research and Development," "A Fighting Lady Speaks," and "Self-Preservation in an A-Bomb Attack."

Write to Industrial Services Branch, Office of Public Information, Department of Defense, Washington 25, D. C.

**Foundry Safety Contest**

Continuing improvement in steel foundry safety practices is anticipated as the direct outgrowth of the 1951 national safety contest sponsored by Steel Founders' Society of America. The competition, open to more than 150 member steel foundries, will be conducted during June, July and August, a quarterly period during which precedent indicates accident frequency rates tend to be high. Rules of the American Standards Association will be used to determine lost-time injury rates for the participating foundries. Plaques and certificates will be presented to the winners.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON . . .
MEASURING ATTACHMENT
for Lathes (Direct Reading) *Saves Time • Reduces Waste*

• This handy Weldon attachment measures directly the forward or reverse movement of the lathe carriage, within .001 of an inch. Easily attached to most lathes by drilling and tapping of one hole. • Dependable, accurate, convenient—saves time and reduces work spoilage.

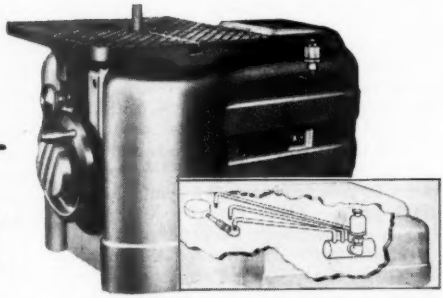
WRITE FOR CIRCULAR LA-1

*Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.*

THE WELDON TOOL CO. Cleveland 4, Ohio
3000 WOODHILL ROAD

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# GRIND
## DIFFICULT CONTOURS WITH SPEED AND ACCURACY
## BOYAR—SCHULTZ
## No. 1 PROFILE GRINDER



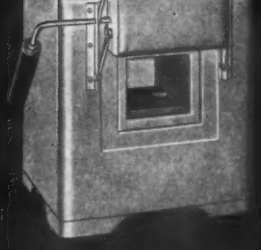
This New Improved Oiling System was developed to keep the spindle thoroughly lubricated thus increasing its life of accurate grinding. The vertical oscillating ways are also lubricated in the same system.

With higher standards of accuracy in demand . . . and at lower costs, the tool known to supply both is a favorite with every user.

Boyar-Schultz No. 1 Profile Grinder gives you accurate grinding at difficult contours, odd shapes and profiles at time saving speeds. Many are the jobs that just CANNOT be done economically, by any other method. You owe it to your own shop to investigate this time saving tool.

See our No. 2 Profile Grinder for larger and heavier profile grinding.

BOYAR-SCHULTZ CORPORATION 2112 Walnut Street, Chicago 12, Ill.



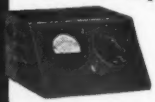
New improved design—welded steel body—4½" dual insulation—uplifting counterbalanced door—heavy duty element embedded in all four sides of heating chamber.

TEMCO

## SERIES 1600 ELECTRIC FURNACE

FOR HEAT TREATING TOOLS, DIES, PARTS AND GENERAL LABORATORY WORK

Fast-heating sturdy TEMCO model built for continuous use to 1750° F., intermittent to 2000° F. Supplied with either 500 series TEMCOMETER stepless temperature controller and indicator (illustrated) or with Model 292 electronic controlling pyrometer.



| Model | Chamber W" H" D" | Volts 50/60 cy. | Furnace and Temcometer | Furnace and 292 Controller |
|---|---|---|---|---|
| 1625 | 5½ x 4⅞ x 9 | 115 | $161.00 | $318.00 |
| 1620 | 5½ x 4⅞ x 9 | 230 | 161.00 | 318.00 |
| 1635 | 5½ x 4⅞ x 13½ | 115 | 195.00 | 350.00 |
| 1630 | 5½ x 4⅞ x 13½ | 230 | 197.50 | 350.00 |

Write for new handy Reference File and dealer's name

THERMO ELECTRIC MANUFACTURING CO.

474 W. Locust St., Dubuque, Iowa

. . . Drilling Cast Iron, from page 70

to change spindle speeds on the machine. Carbide spot drills preferably should be as short as possible to insure that the holes will be located in a manner that will give minimum runout. Where this general practice is followed, quick change tool holders (commonly used with both spot drill and regular drill fitting the same collet) are quite satisfactory with carbides.

Whenever possible, it is desirable to drill holes in cast iron parts from the solid instead of using them to enlarge a cored opening in the casting. Frequently the shifting of cores during the casting operation in the foundry results in an uneven stock removal. This in turn causes a decided drill runout which, combined with the fact that the drill lips near the drill margin are working in rough, scaly and sandy surfaces, may result in chipouts and excessive wear. This shortens the drill life of either carbide or high speed steel drills.

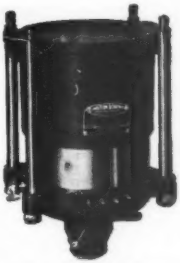
### Putting the Drill to Work

When setting up a new carbide drilling job, it is advisable to record the number of holes drilled for a given set of speed-feed conditions for several runs to obtain the trend of holes per grind. Two or three trial runs may be necessary to determine most effective speed range. At no time should the drills be allowed to become excessively dull, thereby causing complete drill failure.

These data can then be used not only to determine best operating conditions but also to indicate the number of holes after which a drill should be removed for sharpening. Usually the best thing to do is to set the drill-change time at 50 to 100 holes less than the minimum obtained in the trial runs. As with other carbide tools, carbide twist drills should be removed for sharpening before they become really dull, if maximum continuity of production and maximum overall drill life is to be obtained.

The consistency with which carbide drills operate when correctly applied makes this practice entirely feasible. For instance, on a tough job where drills had chipped after runs of 750 holes per grind, no difficulty was experienced when the


**DIE CUSHIONS THAT MODERNIZE YOUR DIE CONSTRUCTION AND DESIGN**



**ADAPTABLE TO ALL DEEP DRAWING PRESS OPERATIONS.**

Self-contained unit, quickly installed on any punch press.

Furnished with hardened and ground pin pressure pad.

| DIE CUSHION PISTON DIAMETER | | | | | | |
|---|---|---|---|---|---|---|
| 5" | 6" | 8" | 10" | 12" | 14" | 16" |
| MAXIMUM DRAW | | | | | | |
| 2" | 2½" | 3" | 3" | 3" | 4" | 5" |
| DRAW RING HOLDING PRESSURE (in tons) | | | | | | |
| .9 | 1.4 | 2.5 | 3.9 | 5.7 | 7.7 | 10.0 |
| SHIPPING WEIGHT (approx. lbs.) | | | | | | |
| 66 | 138 | 150 | 200 | 310 | 450 | 650 |

*Write for Catalog No. 100-1*

DAYTON ROGERS
*Manufacturing Company*
MINNEAPOLIS 7, MINNESOTA

HEAVY DUTY
"MITI-MITE" NO. 150
*The new, amazing magnetic base holder for mounting Test Indicators to flat or curved surfaces* ***INSTANTLY!***
NO MORE CUMBERSOME HAPHAZARD CLAMPING

Complete accessories included for taking all indicators up to 3" dia.

Magnetic pull, approx. 100 lbs. Size of base, 1¾" x 4".

Ball and socket swivel construction permits precision adjustment.

Fingertip control for operating magnetic release.

Shows MITI-MITE being used as surface gage.

| OTHER "MITI-MITE" UNITS | | |
|---|---|---|
| No. 100 | Magnetic base Holder for smaller test indicators. | $7.50 |
| No. 120 | Combination Test Indicator magnetic base holder and double lens 4X Magnifier. | 12.00 |
| No. 200 | Magnetic Base Handi-Lite complete with 25 and 40 watt bulbs. | 8.50 |
| No. 300 | Combination of No. 100 and No. 200. | 15.50 |

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Order from your mill supply dealer or send order with name of your mill supply dealer

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41 YEARS EXPERIENCE

**No. 230-No. 231 DEEP THROAT POWER PUNCH PRESSES**

**These sturdy, deep-throated presses are widely acclaimed for their high speed and accurate production. Frames are welded steel; auxiliary attachments available, various punches and dies in stock for these two outstanding models.**

**Capacity: 20 tons**
**Throat Depths: 18" and 24"**
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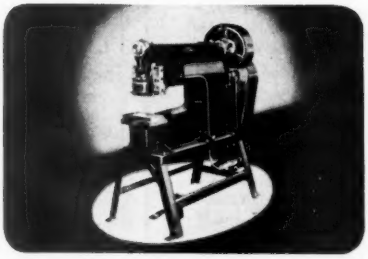


**WHITNEY METAL TOOL COMPANY**
724 FORBES STREET • ROCKFORD, ILLINOIS

drills were changed after each 700 holes.

### Cutting Oils, Coolants

Practically all drilling of cast iron parts to date has been done dry since this practice holds the range of temperature fluctuation to a minimum, thus contributing to longer drill life. In those cases where a coolant must be used, a soluble oil solution will be satisfactory. However, the shock from the coolant hitting the hot carbide as it is pulled out of a hole where it was covered with hot chips may reduce the number of holes per grind as well as shorten drill life. Under such conditions, operating the drill in the lower portion of the carbide drill speed-range will lower the cutting temperature and improve drill life.

An automatic valve arrangement whereby coolant is shut off just before the drill is pulled out of the hole and is turned on again just before the drill starts to drill, will also prove helpful. A typical operation to which this applies is on machines where coolant is necessary because of other, simultaneous, maching operations.

### Drilling Other Materials

Such materials as ordinary cast brass and bronze also can be drilled with carbide tipped twist drills at the higher cutting speeds and feeds.

These carbide twist drills have not as yet proved satisfactory in the drilling of steel and are not recommended for that purpose. For such materials, modified gun drill styles such as the "all-depth" type of drill are preferable. For holes above 1¾" diameter or thereabouts, carbide trepanning tools offer highly interesting possibilities for faster drilling of steel.

---

**ROBERT D. LAWSON** has recently been named sales manager of Norton Company's grinding machine division. Mr. Lawson had been Chicago district manager for the company's grinding machine division since 1946. Mr. Lawson's Chicago district managership has been taken over by Wilfred R. Ogg, formerly the New England sales representative for Norton grinding machines. Louis J. Camarra of the Foreign Division has been assigned to handle the Northern New England territory.

Grinding Valve Stems and Faces

**HOW THE CORRECT CUTTING FLUID MULTIPLIED GRINDING WHEEL LIFE 8 TIMES!**

THE table below shows the outstanding results which can often be secured simply by asking D. A. Stuart Oil Co. to investigate your cutting fluid requirements:

| | BEFORE | AFTER |
|---|---|---|
| GRINDING FLUID | SOLUBLE OIL "X" | STUART'S SUPERKOOL 81X GRINDING OIL |
| Material | Steel Forgings Rc 30-36 | Steel Forgings Rc 30-36 |
| Stock Removal — Valve Face | Rough & Finish Grind .014" in TWO passes | Rough & Finish Grind .014" in ONE pass |
| Stock Removal — Stem | .004" - .006" in TWO passes | .004" - .006" in ONE pass |
| Average Production Per Wheel Dressing | Stem — 350-400 Face — 300-350 | Stem — 2000 Face — 1200 |
| Total Wheel Life | One Week | Eight Weeks |

*Write for literature and ask to have a D. A. Stuart Representative call.*

D. A. Stuart Oil Co.

2729-37 S. Troy Street, Chicago 23, Ill.

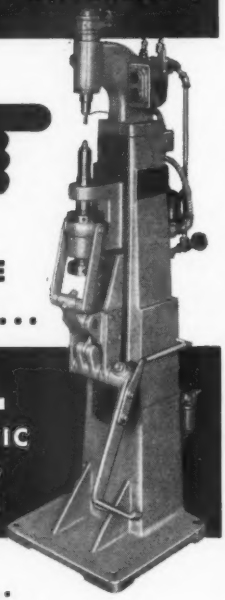

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

ARE YOUR RIVETING PROBLEMS "DIFFERENT"?

...THEN

HERE

IS THE MACHINE FOR YOU...



HILL PNEUMATIC RIVETING MACHINE

FAST...

WIDE RANGE...

LOW MAINTENANCE COST...

NO CLUTCHES, CAMS, etc. TO WEAR

Have you a production situation where rivet-assembly is giving trouble? Are you getting bad heads, irregular results, too much scrap? Then it is time for you to investigate the HILL RIVETER — the modern, improved machine that is leading the way to lower costs. Write today for Bulletin HR — read all about it!

FREE DEMONSTRATION

Send us *unriveted* samples of your problem pieces... let us show you what the HILL machine can do. No charge, no obligation of course.

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1028 MULBERRY ST., ROCKFORD, ILL.

## Fast Production of Intricate Stampings

An important step toward speedy, successful production of intricate stampings has been taken with the introduction of the "Piece-Maker" automatic production press.

Features that enable the "Piece-Maker" to meet the most rigid press requirements include: (1) flywheel-type combination air-operated friction clutch and brake; (2) pendent, pedestal or press mounted clutch controls; (3) four extra-long gibs with eight guiding surfaces controlling slide in two directions; (4) adjustable bronze ways on each corner of slide; (5) long sleeve-type, manually-operated slide adjustment; (6) four-piece tie rod construction; and (7) feed and auxiliary equipment to meet any production needs.

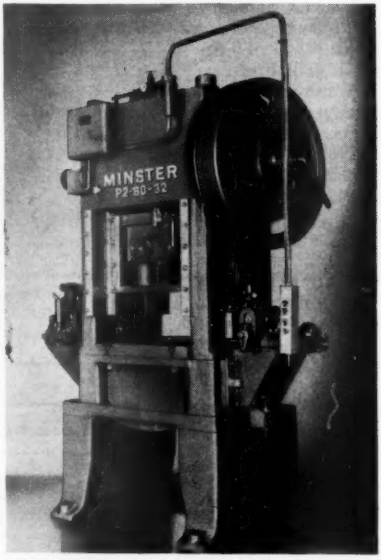



Photo courtesy The Minster Machine Co.

The "Piece-Maker" has a double throw full eccentric shaft, is offered in the flywheel type and in a capacity range from 20 to 150 tons.

. . . Filler Metals, from page 80

instance of welding in the tool room. When tool makers commit an error in machining, it frequently looks as if the only way out is to start all over. Sometimes inserts have been used to block out the errors, although the method has not proved too satisfactory. Far superior to this arrangement is the use of the electrode to make a more permanent correction in the tool or die. It almost displaces the "barber's philosophy" so prevalent — and commendable — among tool room men: "You can always take off a little more, but you can't put it back." Well, with welding you can put it back, and save the die.

**Types of Dies**

Dies have generally been classified into four major classes:

(1). Cast iron dies
(2). Kirksite dies
(3). High speed steel dies
(4). Shoe or "clicker" dies

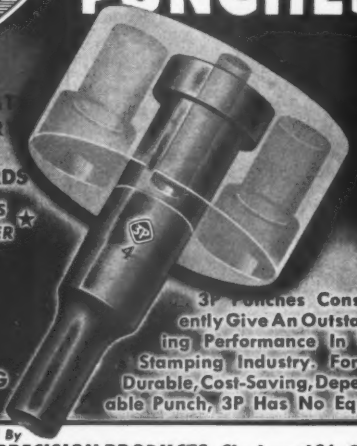
**Cast Iron Dies.** Cast iron dies are usually large and massive, and are used for stamping or forming large sheet metal parts such as automobile bodies, fenders, machine guards, housings, etc. Although there are still some gray iron dies in use, the trend nowadays is to the use of some type of alloyed cast iron, such as Meehanite, which possesses greater toughness and strength.

If a large cast iron die breaks, it is seldom advisable to attempt welding it. However, if the die is relatively small, it can usually be salvaged in the following manner:

The break should be carefully cleaned, and all traces of oil or lubricating solution removed. Following this, the edges should be beveled so that at least three passes of weld metal can be deposited. A quick and easy method of accomplishing both the cleaning and chamfering operations in one, is to use a special oxygenless cutting electrode developed by the company, which can be used with any ordinary arc welding machine. Preheating follows. If the weld deposit is to be ground to finished size, a preheat to 300 or 400°F is sufficient. If the die is to be machined to finished size with high speed cutting tools, a higher preheat of 600-700° F. is recommended.


Still the Best Performer

3P HEAD TYPE PUNCHES



IMMEDIATE DELIVERY on all STANDARDS

★ SPECIALS TO ORDER ★

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3P Punches Consistently Give An Outstanding Performance In The Stamping Industry. For A Durable, Cost-Saving, Dependable Punch, 3P Has No Equal.

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THE DIE SUPPLY COMPANY.....Cleveland 9, Ohio
GULLBERG DIE SUPPLIES CO.....Detroit 11, Mich.
PATE SUPPLY COMPANY.....Birmingham, Ala.
STANDARD DIE SUPPLY, INC.....Indianapolis 4, Ind.
C. O. VOLTZ COMPANY.....Prospect Hts. (Chicago), Ill.


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

## OPTICAL MICROMETERS

**Toolmakers Microscope**

$429.00* Prompt Delivery. .0001" accuracy. 6½" x 6½" range. Net weight 38½ lbs.

* Without lights or gage rods.

New York and Pennsylvania agent needed.

WRITE AIRMAIL

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P.O. Box 181 TUCSON 1, ARIZONA

FREDDY FEDERAL SAYS:

IT'S Federal SHORT RUN STAMPINGS

• FOR YOUR EXPERIMENTAL AND PRODUCTION UNITS

3 PIECES OR 10,000, you can depend on quality when you specify Federal "Controlled Tolerance" stampings. Send prints for quotations, or write for FREE descriptive, illustrated bulletin.

Federal TOOL AND MANUFACTURING CO.
3614 ALABAMA AVE. ST. LOUIS PARK
MINNEAPOLIS, MINNESOTA
QUALITY STAMPINGS IN SMALL QUANTITIES

**Rugged Construction, Unsurpassed Accuracy and Finish for only $15.00**

## THE "SPOT-ON" UNIVERSAL DIAL TEST INDICATOR

Shown actual size

Easily Read Dial Reversing Switch!

**Precision made in England**

- Readings in .001"
- Range .030"
- Swiveling contact with extra light pressure
- Attractively packaged
- Guaranteed!

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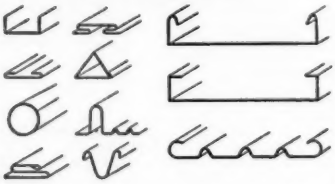
136 Lafayette St. New York 13, New York

## ROLL FORMING MACHINES AND ROLLER DIES

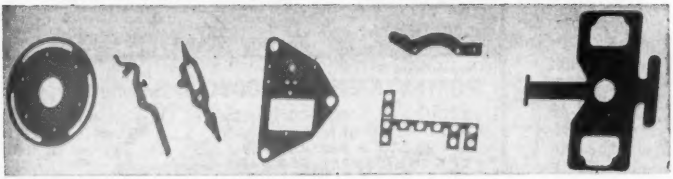


Also Pittsburgh Lock Machines, Pipe and Elbow, Beading, Turning Machines and all other Sheet Metal Working Machinery. Your inquiries invited.

**Maplewood Machinery Co.**

**2634 Fullerton Ave. Chicago 47, Ill.**

## STAMPINGS --- SHORT RUNS



**A dependable service for small quantity requirements for new developments and production up to 50,000 pieces. QUICK DELIVERY—ACCURACY —backed by 21 years' experience.**

**SMALL LOT STAMPING CO.**

Linden 2-4100
1025 W. Blancke St.

"Dedicated to Short Runs"

Linden, New Jersey

As outlined earlier, a "cushion" technique is often helpful in preventing fatigue failures. Whereas in steel a special high-chromium electrode (EutecTrode 68) is used as a "cushion" a special nickel-alloy electrode (EutecTrode 24) is used for the same purpose, and with the same beneficial effect, when welding cast iron. Following these "cushion" layers, the requisite overlay alloy may be used. If in doubt as to which electrode should be used for the final overlay, a short trial bead should be run, and its hardness compared with that of the original die by the "file test".

**Kirksite Dies.** Kirksite dies are used largely in the aircraft industry to form aluminum parts, and in the general manufacturing field to form light gauge galvanized iron. Kirksite is a die metal alloy consisting mostly of zinc, with small percentages of magnesium, aluminum, and copper. It has a very low melting point, and since dies made of this alloy seldom break in two, not much experience has been gathered in welding them. Frequently dies of this type do, however, become gouged, scored, or chipped, and would be useless if such damage could not be undone by means of welding.

The dies are prepared for welding as outlined perviously—cleaned, and beveled—and the area thus prepared is then filled in with a special Eutectic Low Temperature Alloy which is ideally suited to this repair because its hardness and toughness are similar to those of the original die material. No tempering is required with this material.

**"Clicker" Dies.** Still another category is a type of die known as a shoe or "clicker" die, used extensively in the shoe industry. The die is made up out of strip steel—approximately 3/32" thick—which is bent to the requisite shape, and then sharpened on one side to a knife edge. A cookie cutter, used in the kitchen, is a very basic counterpart of such a die. Wooden or rubber "pads" are generally employed to hold the material to be cut, which material is almost invariably some softer substance such as cardboard, rubber, leather, or fiber. "Clicker" dies are

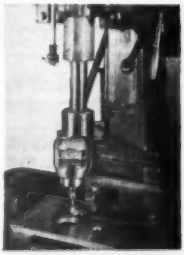

Smooth Harmony

Onsrud
AIR TURBINE GRINDERS

Here's power, speed, and economy to meet your needs for every type of grinder work. Such performance is unique in tools of their size and weight. Designed for easier handling, Onsrud AIR TURBINE PORTABLE GRINDERS are cheered far and wide for their light weight . . . and vibration-free operation which reduces operator-fatigue. And you'll like their low initial cost . . . and still lower operating cost.

- Onsrud B-1 Grinder 75,000 RPM . . . 1/6 HP for 1/4" wheels and smaller.
- Onsrud E-1 Grinder 38,000 RPM . . . 1/2 HP for 1/2" to 1" wheels
- Onsrud D-1 Grinder 50,000 RPM . . . 1/4 HP for 1/2" wheels

Onsrud
D 1-S HOLE GRINDER



With machine tools at a premium, the Onsrud D-1-S HOLE GRINDER lets you expand the use of your present machines at little cost and at once. Precision-made for mounting as tool on jig borer, milling machine, lathe, radial drill . . with quick, simple set-up. Onsrud Air Turbine Motor develops ¼ HP at 50,000 RPM at 100 lbs. air pressure, for direct spindle drive to grinding wheel. Write for information today.

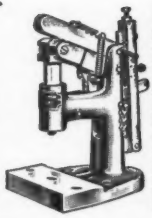
ONSRUD MACHINE WORKS, INC.
3900 PALMER STREET • CHICAGO 47, ILLINOIS
Distributor and Agent Inquiries Invited


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

HIGH-SPEED

## COLD RIVETERS

Thousands of now happy users originally started with us by submitting sample assemblies of their riveting work. Without charge we studied their particular problem, and returned the assembly properly riveted with complete analysis, recommendations and quotations.
It's a FREE service, that may save you time, materials and spoilage—and speedup production. Why not write us?



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Is YOUR problem DIFFERENT? We have met and solved thousands of such problems—from cameras and meters to toys and electrical items.
Anything for staking or riveting fixed or movable joints—anything in eyeletting, grommeting, burring, pointing with platinum, tungsten, silver—whatever your problem, we can help you. No obligation.
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"Cope System" of *correspondence* training prepares you for a prosperous future, *while you keep your present job!* Hundreds of graduates owe their rapid rise in TOOL engineering field to CREATIVE ability acquired through this easy training. Correspondence course includes methods and texts used by our residence school.

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**ACME** *School of Die Design*
(Correspondence School Div.)
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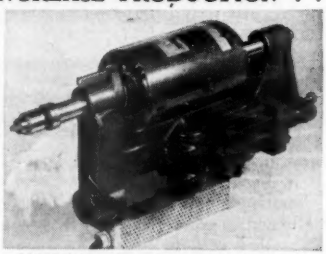
## "Speed-Right" DRILLING MACHINES

.004" to .156"

## INCREASE PRODUCTION . . .



**COMPACT AIR-FEED DRILL HEAD**

● Fingertip Variable Speed ● Fast Approach Air Feed ● Hydraulic Feed Adjustment ● Electric or Manual Control ● Deep Hole Drill Cleaning ● 1000-10,000 or 2500-15,000 RPM.

Write for "Five Steps to Better Drilling"

THE ELECTRO-MECHANO CO.
260 EAST ERIE STREET
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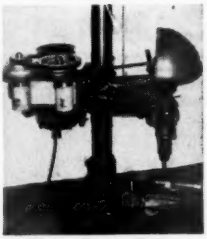
## NEW! LOW COST! TIME SAVING SPEED REDUCER FOR DRILL PRESSES

Easy to install, the Newman Speed Reducer is a multiple-speed attachment which is valuable wherever drilling, tapping, and reaming are done
Reduces spindle speed from 1725 RPM to as low as 100 RPM
Allows drill head to move freely up and down
Speed changes take less than a minute
Fits almost any standard motor base up to ¾ HP

**LOUIS NEWMAN MACHINERY COMPANY**
8-10 STEARNS SQ., SPRINGFIELD, MASS.



Write Dept. T for prices and details

inherently very delicate, and break readily. Being made of high-carbon steel, however, their repair is not difficult, since either a special thin-flowing silver type alloy or EutecRod 16FC can be used to join the broken edges. No grinding or other preparation is necessary; the broken edges are simply butted together, with as little clearance as possible (highest strengths are obtained with a clearance of about .003"). EutecRod 16FC is then flowed through the break, and after cooling the repaired "clicker" die is as good as new.

**Conclusion**

Of course, there is much more to tool and die welding. A good tool and die welder is a man with years of experience, a man who takes pride in his work, and who works with the surety and dexterity of a surgeon. To know that there are materials which will simplify his task and will make it easier for him to turn out first class work, may enable him to attempt and successfully complete die repairs that he had hitherto considered impossible.

★ ★ ★

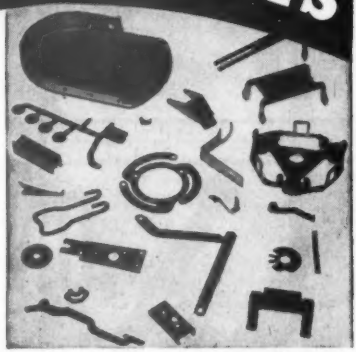
**SPIRAL STEP TOOL COMPANY** has recently occupied a new building at 5400 N. Damen Ave., Chicago 25, Ill. The new quarters will enable the company to step up production of special ground step drills for drilling multi-diameter holes. These tools have wide application on screw machines, turret lathes and drill presses.

**CORRECTION**

Apologies to our readers and to Crest Manufacturing Company, 3001 Welton Street, Denver 5, Colorado, for the two errors that inadvertently occurred in Crest's tool steel advertisement on page 122 of the April, 1951, issue of TOOLING and PRODUCTION. The column of available sizes should have been expressed in diameter of "rounds" rather than "rods." Proper analyses for the second and third makes should have read as follows: Houghton & Richardson Vanadium—Carbon 1.05-1.15, Manganese .25, Silicon .20, Vanadium .18, Chromium .16. Crescent Special —Carbon 1.05-1.15, Manganese .35, Silicon .20. All the steel advertised is carried in stock, ready for immediate shipment.


DIE CUT PARTS

WLS SPEEDTOOLING Gives You PRECISION STAMPINGS for a Tool Charge as Low as 1/10 the Cost of Ordinary Dies



*Our Specialty: Small Irregular Shaped Parts Stamped, Formed, Pierced, Extruded, Stencilled, Tapped, Countersunk.*

For detailed information, send for literature. For firm quotations and delivery commitments, send us your prints.

WLS STAMPING COMPANY

Short Run Stampings

3290 East 80th Street Cleveland 4, Ohio

*Write Us Today!*

SHORT RUN STAMPINGS

## Westinghouse Division Sub-Contracts Defense Orders

Sixty-four per cent of the total military bookings of the Electronics and X-Ray Division, Westinghouse Electric Corp., Baltimore, Md., were sub-contracted to small and large business firms from Maryland to California during 1950. Increasing military orders received in 1951 promise expanded sub-contracting.

Contracts placed ranged from a $62 order for brass caps from Hamilton Associates, a newly-organized Ellicott City, Md., manufacturing firm, to a $2,938,488 contract with Dalmo Victor Co., San Carlos, Calif., for intricate and complex radar antenna.

In filling military and commercial orders during 1950, the Division drew on 2361 suppliers and sub-contractors from 32 states and Canada. Approximately 40 per cent of the Division's purchasing bill was paid to sub-contractors, and the remainder was split between regular suppliers and suppliers who build parts modified to meet Westinghouse engineering specifications.

ONE ALL-PURPOSE TOOL HOLDER
INSTEAD OF TEN
ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16"
HOLLOWING OUT
LEFT SIDE FACING
RIGHT SIDE FACING
PLAIN TURNING
GROOVING
SHOULDER TURNING OR FACING
OUTSIDE THREADING
BORING, UNDERCUTTING, OR INTERNAL THREADING
ACME TOOL COMPANY
69 WEST BROADWAY
NEW YORK 7, N. Y.

. . . Coil Cradles, from page 64

The rotating guide plates for coil are mounted with special steep angle type roller bearings to give a better ratio between thrust and radial loads present in this type of application. The main support shaft for the guide plate assembly is heavy to reduce overhang deflection and will keep the face of the guide plate square with the coil. The adjustment of these side plates can be made either manually by handwheel or motor controlled.

This complete guide plate and shaft assembly is carried by the side box type frame sections and is one of the reasons for their stiff construction.

The loop control (see Fig. 4) can be one of several developed for this purpose and is used to control the main drive motor, thus governing the size of loop.

An attachment called a coil catcher is an auxiliary device built in to afford a cushion effect for absorbing the impact of the coil as it enters the cradle and for smoothly lowering the coil on the driving rolls. It consists of a floating roll which is actuated through a bellcrank by a hydraulic cylinder. This hydraulic cylinder exhausts through a needle valve to a tank and the reverse flow is through a ball check valve. This will give, to some extent, the same action as a door check. A hydraulic pumping unit is not needed as air under line pressure in the tank above the oil is used to give the initial pressure.

The height of the front of the frame is low which makes it possible for the user to match his ramp or conveyor to it without going to an unreasonable height. The use of a ramp or conveyor which will hold a number of coils for loading the cradle, in distinction to using a crane and loading the coils one at a time, saves time when crane service is not instantly available.

Exclusive Tru-Grip Tap Holder is lighter, smaller in diameter, affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

**Procunier**
*Safety Chuck Company*
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CHICAGO 6, ILL.

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**PROCUNIER**

***High Speed Tapping Head***

Industry has long appreciated the many exclusive features and advantages found only in Procunier Tapping Machines. Precision built for faster, more accurate tapping, they have consistently proven their superiority on high-speed production runs. For more than 30 years they have been giving the tapping industry dependable service, insuring cleaner, sharper threads—with fewer broken taps, fewer spoiled pieces.

HERE'S WHY:

1. **Tap breakage is practically eliminated** due to the high sensitivity of the new Procunier cork-faced friction clutch which automatically regulates driving pressure. Operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch—
2. **Strain and wear are minimized** and tortion eliminated thru special gear reversing mechanism.
3. Chuck spindle is supported at both ends assuring true operation—**avoiding tap wobble.**
4. **Aluminum housings** assure greater strength and rigidity, PLUS many other exclusive features.

WRITE TODAY

for full details and specifications on the complete line of Procunier Tapping Machines.

Gentlemen:
Please send your illustrated brochure on Procunier High Speed Tapping Heads.

Name _____

Address _____

City _____ Zone ___ State _____


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

. . . Watch Parts, from page 92

Ram pressure is adjustable and can be preset for any required tonnage within the capacity of the press. It delivers this exact pressure with every stroke, but only upon contacting the work surface. Consequently, any possible variation in height of the parts in production cannot affect the finished accuracy. With oil-hydraulic actuation of the ram, an extremely slight dwell precedes full pressure buildup, giving the metal a time opportunity to flow properly. The part gradually conforms to contours of the die instead of being mashed into shape by heavy, inflexible impact. After the part is swaged, the loaded fixture automatically indexes to the next position. Here an ejector under the table lifts the piece from the die, and a jet of air ejects the finished part into a box at the side of the table.

This swaging operation formerly was done on a drop hammer; however, the hydraulic press operation results in: (1) better, more precise control of pressure application; (2) easier maintenance of the close tolerances required; (3) faster production with a shorter ram stroke; (4) increased safety, and (5) improved working conditions due to reduced vibration and noise. In addition to these operating advantages, the Multipress occupies less floor space and needs less overhead room.

★ ★ ★

**A New Office** and showroom at 5835 W. North Ave., Chicago, has just been jointly occupied by The Bryant Chucking Grinder Co., Fellows Gear Shaper Co. and Jones & Lamson Machine Co., all of Vermont. The three companies will be represented in the newly constructed single story building by the same personnel as heretofore.

**Dayton Rogers Manufacturing Co.** of Minneapolis, manufacturer of stampings, molded plastics and die cushions, has appointed Homer L. Lacock of 905 South Ave., Rochester 20, N. Y., as general sales manager in the upper New York area. He will serve as a full-time sales engineer for Dayton Rogers.

**Richard J. Brown** is the new advertising and sales promotion manager of the Delta Power Tool Division of Rockwell Manufacturing Co., Milwaukee. Mr. Brown had been director of advertising and sales promotion of the Crane Packing Co. of Chicago.

*For Precision Work...*

**Baldor's**

## Carbide Tool Grinder

has balanced armature and wheels, runs smoothly on LARGE ball bearings. Grinds wet or dry. ½ hp 3400 RPM reversible motor; 6" silicon carbide wheels. Complete price, $142.60.

Baldor

**BALDOR ELECTRIC CO.**
— Over 30 Years —
4369 DUNCAN AVE.
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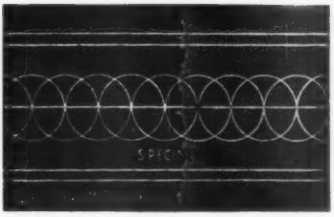

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***STOPS LOSSES***

**making dies and templates**

Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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**THE DYKEM COMPANY**

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**All Types of Holding Fixtures for Machine Shop Production**

**Five Lock Sizes**

**75 Various Model and Fixture Sizes to Choose From**

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PHILADELPHIA — Morgan Tool Equipment Co.
LOS ANGELES — Technical Broaching Co.
NEW ORLEANS — Engineering Sales Co.
CINCINNATI — R. W. Pratt
BOSTON — A. R. Shevlin & Co.
TOLEDO — Peerless Tool Service Co.
CANADA — Firth Brown Tools, Ltd., Galt, Ont.

CATALOG 941 AVAILABLE

# SWARTZ

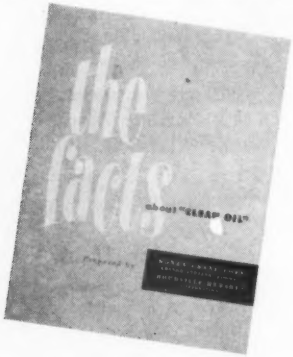
**TOOL PRODUCTS CO., INC.**

Telephone WE 3-1522
13330 Foley Ave.
Detroit 27, Michigan

SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

*Circle postage-free Inform-A-Gram Key Number for your request.*

**"The Facts About Clean Oil"** is a new 16-page, Honan-Crane booklet that answers all the questions about oil purification; shows correct method and equipment to stop downtime,




cut down rejects, improve and increase plant production. Actual case histories are cited. HONAN-CRANE CORP., 208 Indianapolis Ave., Lebanon, Ind.
**Circle Inform-A-Gram No. C1.**

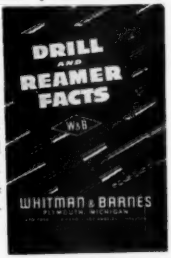
**Barrel-Finishing with Alundum Tumbling Abrasive** is described in a current issue of Norton Company's "Grits and Grinds." Subjects discussed in this informative article include: choice of cleaners, rust preventives, operating hints, roughing, finishing, washing and many others. To get your name on the "Grits and Grinds" mailing list, write to NORTON CO., 1 New Bond St., Worcester 6, Mass.
**Circle Inform-A-Gram No. C2.**

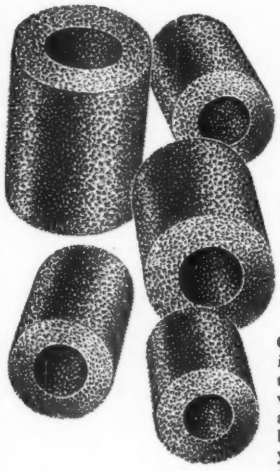
**Shear Selector Chart.** Simonds Saw and Steel Co. is distributing a cardboard chart that gives detailed selection and setting instructions for "Red Streak" Rotary Shear Knives. These knives are made from high chrome, special alloy and high speed steels. Copies of the Shear Selector Chart can be obtained from SIMONDS SAW AND STEEL CO., 470 Main St., Fitchburg, Mass.
**Circle Inform-A-Gram No. C3.**

**The Federal Dimensional Quality Control Primer,** now in its seventh printing, furnishes a practical approach to the problem of applying statistical quality control to dimensions. Its 39 pages contain definitions, an explanation of dimensional quality control, first steps in applying statistical quality control to dimensions, and a discussion of the formation and use of quality control charts. Single copies of the primer can be obtained without charge from Federal Products Corp. Prices of quantities of Federal's work sheets, shop analysis charts and operation control charts are available on request. FEDERAL PRODUCTS CORP., 1144 Eddy St., Providence 1, R. I.
**Circle Inform-A-Gram No. C4.**

**"Welding, Joining and Cutting of Gray Iron"** is a new technical manual published by Gray Iron Founders' Society. This 40-page book describes new processes and improved techniques for successfully welding gray iron. A four-page folder that fully describes the subject matter covered in the manual and lists prices to Society members and nonmembers can be had from GRAY IRON FOUNDERS' SOCIETY, INC., National City-E. 6th Bldg., Cleveland 14, Ohio.
**Circle Inform A-Gram No. C5.**

**"Drill and Reamer Facts,"** an informative, 35-page, Whitman & Barnes booklet, has been brought out in a revised fourth edition. The "Drill Facts" section describes and illustrates the design and construction of twist drills, correct drill pointing as well as general suggestions in the proper use and care of drills. Recommended speeds and feeds, cutting compounds and types of drill point to use, when drilling various materials, are also shown. The section on reamers contains a short treatise on the design, construction use and care of reamers. A separate section is devoted to care and use of carbide-tipped tools. Write to WHITMAN & BARNES, Dept. T&P, Plymouth, Mich.
**Inform-A-Gram No. C6.**





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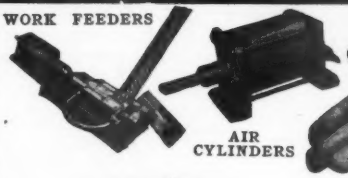

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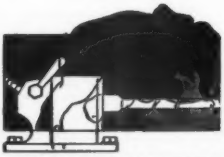

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**"Manual of Welding Engineering and Design"** is now offered by Eutectic in a revised, third edition. This latest, 50-page edition contains a considerable amount of new information. Now included are articles on joint preparation by means of electric arc; additional design information; comparative data; 1951 welding alloy developments; new Chemical Welding Aids developed within the past year; and many items of new procedural information. EUTECTIC WELDING ALLOYS CORP., Dept. P, 40-40 172nd St., Flushing, N. Y.
**Circle Inform-A-Gram No. C7.**

**Revised J.I.C. Hydraulic Standards** are offered by Miller Motor Co. in a 16-page booklet. Incorporating all changes and additions made at the most recent meeting of the Joint Industry Conference on Hydraulics, these standards are reproduced word-for-word. The booklet also contains a sample circuit, a glossary of terms, two pages of standard symbols and other useful information. MILLER MOTOR CO., 4027 N. Kedzie Ave., Chicago 18, Ill., will promptly honor all requests.
**Circle Inform-A-Gram No. C8.**

**A Poster Chart** on the care and maintenance of power-driven belts is available from Cling-Surface Co. Simple schematic pictures and text are used to present the proper steps to be taken. Because the heart of power transmission is the power-driven belt, proper care and maintenance of the belt increase production, conserve man-hours and manpower, reduce material replacement and deliver the maximum ratio of production to power. CLING-SURFACE CO., 1032 Niagara St., Buffalo 13, N. Y.
**Circle Inform-A-Gram No. C9.**

A saving of 12 man-hours per shift is reported by *Ross Operating Valve Company* with this fixture, built around 24 "De-Sta-Co" Model #620 Toggle Clamps.

Photos courtesy Ross Operating Valve Co Detroit, Mich.

The fixture holds *Ross* 4-Way air operating valves during a "run-in" operation. The clamp plungers are tipped with rubber grommets which seal exhaust and intake ports during the "run-in," after which the valves are torn down and inspected carefully. Besides the actual saving in man-hours, these "De-Sta-Co" Toggle Clamps convert a tedious setup job into one quickly and accurately performed by less highly-skilled labor.

For your problem in production work-holding there's a "De-Sta-Co" Toggle Clamp that assures increased efficiency, accuracy and savings. Whether you're machining, welding, gluing, bonding, inspecting or assembling, you do it faster . . . and cheaper . . . with "De-Sta-Co" Toggle Clamps. Our catalog describes more than 40 fixture and portable models, holding capacities over 2500 lbs. Write for your copy today, and name of nearest "De-Sta-Co" distributor.

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**The Stokes Vacuum Calculator** is now available for free distribution. This slide rule is designed for numerous, quick computing chores in vacuum research and processing work. It will determine the needed capacity to evacuate a given volume to a specified vacuum in a given time, and the time required to reach a specified vacuum in a given volume with a pump whose capacity is known. It will also determine vapor pressures of water at various temperatures, and capacities of round tanks in both cubic feet per foot and gallons per foot. Address your request to F. J. STOKES MACHINE CO., 5900 Tabor Rd., Philadelphia 20, Pa.
**Inform-A-Gram No. C10.**

**"Molybdenum Disulfide as a Lubricant"** is a 55-page booklet that comprises excerpts from technical papers on this subject. These informative articles are liberally illustrated with photographs, charts and drawings. Copies can be secured by writing to CLIMAX MOLYBDENUM CO., 500 Fifth Ave., New York 18, N. Y.
**Inform-A-Gram No. C11.**

**B & L Optical Parts Catalog L-117** is an aid to engineers and designers who can consult this booklet in the initial stages of instrument development and incorporate standard optical parts in their design, thus avoiding the higher cost of "tailor made" optics. All types of lenses, prisms, reflectors, etc., are described and illustrated. BAUSCH & LOMB OPTICAL CO., Industrial Sales Dept.-T&P, Rochester 2, N. Y.
**Circle Inform-A-Gram No. C12.**

**Hi-Shear's Rivet Tool Catalog** contains a valuable manual section on "Hi-Shear" riveting. This section discusses rivet dimensions for drafting, principles of the "Hi-Shear" rivet and gives other miscellaneous data. The HI-SHEAR RIVET TOOL CO., 8924 Bellanca Ave., Los Angeles 45, Calif.
**Circle Inform-A-Gram No. C13.**

**A New American Standard** for Drill Drivers, Split-Sleeve, Collet-Type, has been approved. This type of driver is used in the automotive and mass production industries to drive straight-shank twist drills. Assembly of drill and collet-type driver necessitates manufacture to close tolerances. This new standard insures that collets will fit drill shanks made according to American Standard for Twist Drills, Straight Shank and Taper Shank, B5.12-1950. For a copy of the new standard, B5.27-1951, write AMERICAN STANDARDS ASSOCIATION, 70 E. 45th St., New York 17, N. Y.
**Inform-A-Gram No. C14.**

**"Corrosion Resistance of Copper and Copper Alloys"** is the latest Anaconda publication. This attractive, 25-page booklet details the theory of corrosion and types of corrosive attack, contains a discussion of corrosion resistance of copper alloys and includes corrosion rating charts and details on standard Anaconda metals and welding rods. THE AMERICAN BRASS CO., Dept. T&P, Waterbury 88, Conn.
**Inform-A-Gram No. C15.**

**Four New Booklets on Safety,** designed for distribution by plant foremen or as payroll enclosures, are announced by the National Safety Council. They cover safety in the plant, at home and on the highway. Humerous cartoons sugar-coat the "message." Sample copies and prices can be had from NATIONAL SAFETY COUNCIL, 425 N. Michigan Ave., Chicago 11, Ill.
**Circle Inform-A-Gram No. C16.**

**A Complete Handbook** on properties and methods of working seamless and welded tubes and pipe of the B&W Stainless Croloys is now obtainable. This 104-page, leather-bound booklet comes in a handy size for desk or pocket. Write THE BABCOCK & WILCOX TUBE CO., Dept. T&P, Beaver Falls, Pa., and ask for Technical Bulletin 1B.
**Circle Inform-A-Gram No. C17.**


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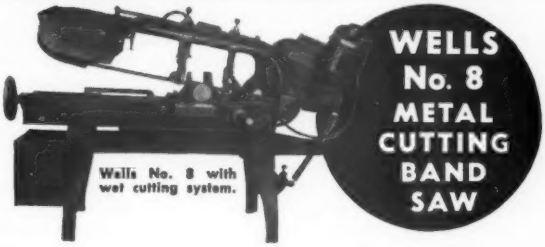


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**METAL CUTTING BAND SAWS**

WELLS MANUFACTURING CORPORATION
1940 CEDAR ST., THREE RIVERS, MICH.


SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# Electric Motor Failures Due to Moisture Are Largely Preventable*

Moisture caused more than 13% of the electric motor failures recorded by the Company during the year 1949. This percentage was obtained from a statistical analysis which embraced all types of motors. They were used for a great variety of purposes and were located in all kinds of plants.

When as high as 13% of the accidents to objects of a certain class are traced to a common cause, there is much to be gained by a study of the individual cases. Such a study will produce information which can be used to develop and improve inspection methods, and indicate where to apply accident prevention efforts in order to accomplish the most good. This requires an analysis of each individual case, and classification of the results to show the principal points where corrective measures should be applied.

*by* **H. M. Marsden**
*Assistant Chief Engineer, Electrical Division, Hartford Steam Boiler Inspection and Insurance Co.*

An analysis of the electric motor failures due to moisture as recorded by the Company for the year 1949 was made for insurance purposes, but some of the information obtained from the study will be of value to owners and operators interested in the prevention of accidents.

### Failure Due to Carelessness

The study revealed that careless handling of liquids was responsible for a large portion of the failures. Many resulted from wetting the motors during clean-up operations in plants where floors must be frequently washed with water. In some cases the streams of water were allowed to play directly on the motors through sheer carelessness. In others, the clean-up personnel had not been advised and did not understand that even the spray rebounding from the floor when washing around a motor can be the cause of a winding burnout.

Overflowing water softener tanks, filters, dye tubs, or other liquid reservoirs of various kinds caused burnouts, many of which could have been eliminated if the vessels had been equipped with overflow drains. On vessels such as stock boxes in paper mills, careless operation of open-ended drains which did not lead to points of safe discharge also caused wetting and failures of motors.

Protection against accidents due to carelessness, such as the cases cited, will depend on conditions in the individual plant, and possible means of prevention are: personnel training, relocation of the equipment, and the installation of totally enclosed motors.

### The Importance of Good Maintenance

Adequate plant maintenance could have eliminated another group of accidents on the list. The accidents in this group were of a type which can be reduced when management recognizes the importance of good maintenance.

A common source of trouble was leakage at packing glands of motor-driven pumps. Other motors failed as a result of the damp atmosphere which surrounded them in poorly ventilated rooms or pits where leakage from boiler feed pumps, condensate equipment, or other apparatus gave off vapors which keep the air continually moist. Some losses were caused by water which dripped through holes in the flooring above the motors. Correction of accident-producing conditions such as these is usually a rather simple matter of plant maintenance.

In some cases, conditions not so easily controlled brought about inundation of motors. Breaking of water piping, failure of roof drainage ducts, and flooding due to choked sewer drains were some of the causes in this category.

### Moisture Absorbed During Idle Periods

Failure to properly dry out the windings of motors after prolonged idle periods was the cause of numerous failures, particularly in seasonally operated plants. In damp climates, moisture absorption during idle periods can largely be prevented by maintaining the machine

*(Continued on page 161)*

**Courtesy: Maintenance News, Westinghouse Electric Corp.*

# Use KIPP AIR GRINDERS if you want to GRIND —not just rub!

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

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**MADISON-KIPP CORP.**
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- Experienced in LUBRICATION Engineering
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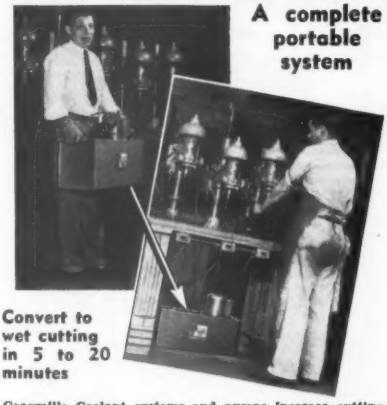

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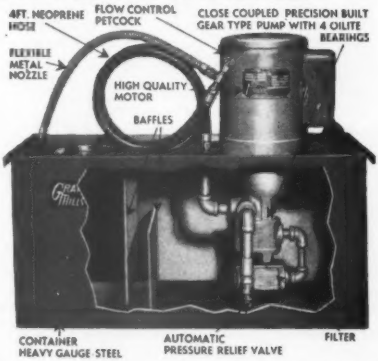
Convert to wet cutting in 5 to 20 minutes

Graymills Coolant systems and pumps increase cutting speeds, improve work quality . . . tool life. Most industrial distributors stock standard units.



Sturdy high pressure gear models . . . smooth high volume centrifugal types in 1/25 to 70 g.p.m., with tank capacities from 5 to 38 gals. Also immersion type centrifugal pump and motor units.

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TIME and MONEY
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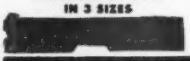


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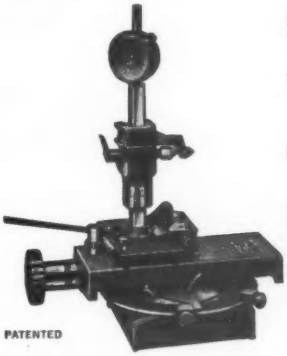
# Sliding Machine Parts Protected by Phenolic Bearing Surfaces

One of the problems that has plagued machine tool manufacturers for many years, particularly builders of heavy equipment, has been the scoring and wear of bearing slides, and consequent loss of accuracy, which results from the constant movement of heavy masses. However, this problem has been overcome in the P&W Keller Type BG-22 by the use of phenolic liners on all slides, thus eliminating the troublesome iron against iron bearing surfaces.

Laminated phenolic plates, sliced edgewise for end-grain surface, are fastened to the slides of the column base, vertical slide, and spindle head, the movement of which provides the horizontal, vertical and transverse motions of the machine. These plates are pinned securely to the castings with phenolic pins and the surfaces are then planed and precision scraped to their mating slides to the same limits of accuracy as were the previous cast iron bearings. The lead screws which drive these heavy members are also protected by phenolic, the nuts being molded of phenolic material, giving a positive contact fit that will not pick up and freeze.

Exhaustive tests, performed over a period of several years, have shown that bearing surfaces of phenolic against iron or steel will not cut or score the slides and lead screws, and with proper lubrication should prolong the bearing life almost indefinitely. Besides the non-scoring and extremely good wearing characteristics of phenolic, it also has a heat-insulating quality which is important for high speed operation under heavy weight.

The large Keller BG-22 operates at rapid traverse speeds up to 250 inches per minute. With complete phenolic bearing protection, continuous high speed operation is made possible over many years of trouble-free service, without loss of accuracy.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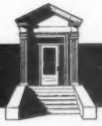
The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16″ to 2″ concave, from .00 to 2″ convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.



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- 30 TONS RATED CAPACITY
- 80 STROKES PER MINUTE
- BED AREA: 16" x 48"
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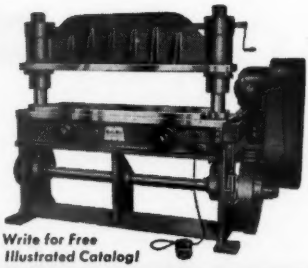

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20" Long x 12" Wide x 6¼" Deep
16 Ga., drag holes, handles both ends.

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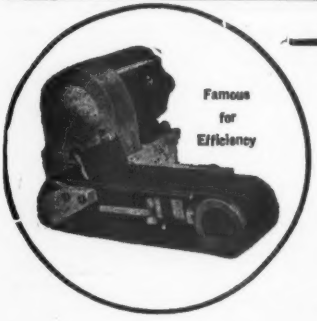


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. . . from page 156

temperature above the condensation point. Electric space heaters will frequently be found to be quite suitable for this purpose since they are available in various sizes, and can be placed in service quickly, usually at low cost. The heaters should be located preferably under the motors, and placed so as to allow for even distribution of heat along the entire length of the machines. Precautions against the possibility of fire should be observed when drying motors in this manner.

The amount of heat required to raise the winding temperature of a given enclosed motor approximately 5°C above ambient temperature, where the machine is closed except for a small vent at the top and bottom for circulation, is given by the formula:

$$H = DL/35$$

where H = heat in kilowatts

where D = machine end-bell diameter in feet

where L = machine stator length between end-bell centers in feet

This formula is quoted from **Recommended Practice for Testing Insulation Resistance of Rotating Machinery**, a report by the **American Institute of Electrical Engineers.**

### The Possible Savings

It is clearly evident from the loss records that, in most plants where motors are used, considerable savings can be made by checking the surroundings of all motors for adverse moisture conditions and making the necessary corrections.

Particular attention to this subject is worthwhile when contemplating the installation of new equipment. If the moisture hazard cannot be wholly avoided, or is inherent in the application for which the motor is used, the manufacturers can provide drip-proof, splash-proof, or totally-enclosed designs, and can give advice on the best selection for the particular application. Any extra cost for the style of motor best suited will more than likely pay a high percentage of return on the investment.

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with the NEW
Cartridge Type Packing Gland

Designed to J. I. C. Hydraulic Standards

Pemaco Hydraulic Cylinders are soundly engineered—give long life and top performance. The steel ram is hardened to 50.C Rockwell, ground and lapped. NOW the Pemaco has the first self-contained Cartridge Type Packing Gland.

This new Pemaco "EASY-PAK" Gland is designed to comply with J.I.C. Standards. It combines double bearing surface, low friction ram seal, and a ram wiper into a single compact unit. Easily maintained, the Pemaco "EASY-PAK" Cartridge Type Packing Gland can quickly be replaced in most cases without removing the cylinder from the machine — and by inexperienced help — greatly reducing machine down-time.

Pemaco "EASY-PAK" Cartridge Type Packing Glands are manufactured for both hydraulic and air cylinders.

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# Serrated Rubber Contact Wheel Doubles Abrasive Belt Life

An entirely new type of backstand contact wheel, Figure 1, for abrasive belt grinding of many products in the metal-working field has been announced by The Carborundum Company of Niagara Falls, N. Y.

The result of more than three years of development and research by Carborundum engineers, the new "61" wheel is a specially serrated rubber wheel that causes a controlled breakdown in the bond of the abrasive belt. The result is that glazing, long the enemy of pro-

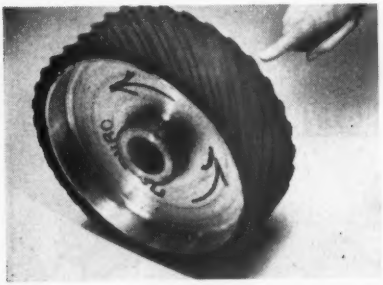

**Fig. 1. New Carborundum "61" serrated rubber contact wheel that virtually doubles belt life in those operations where belt glazing is a problem factor.**

longed and productive belt life, is reduced to such a great degree that the belt life is doubled.

While the idea of a serrated rubber contact wheel is not new, the unique characteristics of the new wheel—the relief angle, wide spaced lands, narrowness of the lands, which are based largely

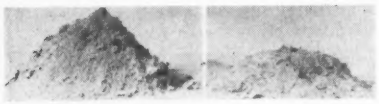

**Fig. 2. Two piles of metal chips above show total stock removal comparison. Pile at right consists of 1571 grams representing stock removal by belt used with ⅀60 Duro R51 contact wheel. Life of belt, 40 contact minutes. Pile at left consists of 3221 grams obtained from same type belt used with new Carborundum "61" contact wheel. Life of belt, 80 contact minutes.**

**Fig. 3. Left. Fifty diameter enlargement of chips removed with belt after 24 minutes operation with 50 durometer standard serrated contact wheel. Right. Chips removed with belt after 80 minutes operation with new Carborundum "61" contact wheel.**

on the design of milling cutters — are entirely new developments, and are responsible for the increase in belt life and cutting rates.

Figure 2 shows a comparison of the metal removed by a 14 feet x 4 inches ⅀80 ALO-EC-M paper belt, tested on low carbon 1015T descaled steel at 7350 sfpm.

Figure 3, left, is a size comparison of chips removed with the same type belt

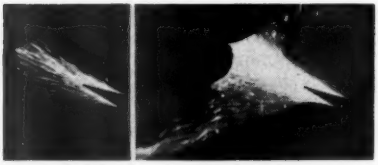

**Fig. 4. Left. Spark pattern from a belt after 24 minutes operation with ⅀60 Duro R51 contact wheel. Right. Spark pattern from same type belt after 80 minutes operation with new Carborundum "61" contact wheel. Camera exposure F5.6 at 50th for both photographs.**

run 24 minutes on a 50 durometer standard serrated contact wheel. Chips at right were removed after 80 minutes operation with a "61" contact wheel.

Figure 4, left, shows the spark pattern from the belt after 24 minutes on a ⅀60 Duro R51 contact wheel, which is much smaller than the pattern on the right, shown after 80 minutes operation on a "61" contact wheel.

Photos courtesy The Carborundum Co.

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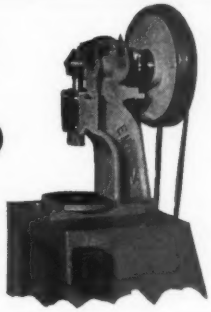

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SEE ADVERTISERS INDEX, PAGE 135, FOR KEY NUMBERS

# A Production Boost for Brazed Assemblies

An improved method of producing silver brazing and soldering rings has made possible worthwhile increases in brazed assembly production.

The Lucas-Milhaupt Engineering Company winds brazing and soldering rings from continuous wire in wire thicknesses and coil diameters to meet individual job specifications. The wound coil is then slotted along the outer diameter, as shown in the upper left, Figure 2, to permit fast, easy detachment of the rings individually from the coil without tangling, distortion or breaking. Thus, detaching the ring from the coil and placing it on the workpiece are performed in one operation. Individually wound rings tend to tangle and become distorted in shape when handled.

Tests show brazing output of electrical transformer connectors was increased 62% by use of the notched-coil rings over the previously-used machine-wound individual rings. Looseness and tangling of the individual preforms during handling limited brazing output to 360 assemblies per hour in spite of the fact that the gas-air heating equipment for the operation, Figure 1, was designed to heat to brazing temperature a minimum of 500 pieces an hour. Use of the notched-coil rings eliminated the handling problem and raised the rate to 560 assemblies per hour on the same equipment.

**Fig. 1. Operator in background illustrates the convenience with which rings can be detached from the coil and placed into transformer connectors as they revolve above the open gas-air jets. Assemblies require no repeating and are completely brazed when they complete the revolution. Operator in foreground removes finished assemblies and inserts new units for brazing.**

Photos courtesy Lucas-Milhaupt Engineering Co.

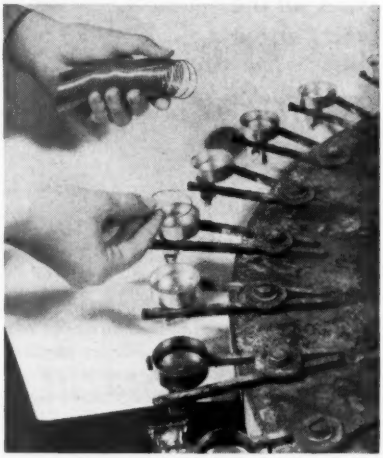

**Fig. 2. Notch running along the outer and upper diameter of the rings permits safe, easy detachment without distorting preforms, and eliminates lost motion in handling. Unused rings can be stored safely in coil form because the notch is strong enough to hold them in place. Elimination of distortion during handling is particularly useful in applications where close tolerances as small as ± .001" are required.**

Preforms are stress-relieved and can be made in gap form for easy compression into inner diameter grooves, and in lap and butt form for keyed and non-keyed outer surface applications. Besides allowing handling and storage savings and convenience, the rings are particularly suitable for exacting applications where the nature of the joint and depth and shape of the groove limit the amount of silver alloy to be used. In such application, specified wire thickness and coil diameters assure that only necessary measured amounts will be used, resulting in considerable material savings and the elimination of post-brazing machining of spillage.

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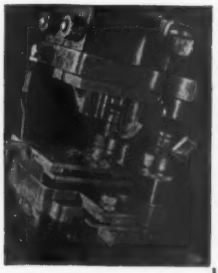

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. . . Die Casting, from page 114
an adequate "feeding" of the die cavity, they should be so located with respect to one another that the individual jets which emanate from them do not intersect one another nor in any way engate one another, thereby engendering additional turbulence of molten die casting alloy.

Futher, the gates must not be so located with respect to one another that the die filling takes place in such a manner as to cause the entrapment of air in or between the two molten alloy rays.

A few simple examples of multiple gates are illustrated in Figure 70.

**Rule IV: Sharp Corners.** The gate should be free of sharp corners, as the presence of these tends to promote heat-checking which radiates from these sharp corners, Figure 71.

It is best to have a gate that has a smooth cross-sectional profile. A jagged profile is to be avoided, Figure 72, as it tends to cause turbulence within the jet or divert it to one side or the other, thus giving rise to improper filling of the die cavity.

While it is possible to calculate the size of gate for a particular type and size of casting, the results are likely to be unreliable and inaccurate due to the intervention of a number of variable factors difficult to evaluate. Therefore, the customary design practice is to stipulate a gate of obviously **shallow depth** and **inadequate width**, and to determine the amount of extention, if any, required by making a number of actual castings during the trial run of the die before it is approved for production use.

It is usually comparatively easy to extend both the width and depth of a gate, even after the die block has been hardened. Portable grinding tools are generally employed for this purpose. Extension of a gate should be performed with extreme care, and possibly with most new die casting dies, a number of repeated trials will be undertaken before gate size is finally established as satisfactory.

Unfortunately as yet, no one has developed any mathematical rules for predetermining either the proper initial gate depth or width, and the experienced die caster, therefore, exercises a great advantage over the inexperienced die caster when it comes to designing gates.

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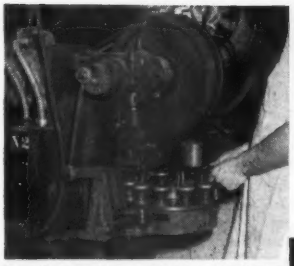

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# SCRAP $1,000 PROGRAM 500,000 SAVES

A scrap conservation program at the Westinghouse Electric Appliance Division plant, Mansfield, Ohio, has added to appliance production and produced a savings estimated at $1,500,000 a year.

Vital materials such as copper, aluminum, brass, nickel and steel—all made scarce by the nation's military program—are being culled from the division's appliance producing lines daily. Some of the material is reprocessed for further use; stamping methods are changed to stretch scarce steel; plating processes are improved to stretch copper and nickel supplies.

Back of the ability to produce dollar savings and the ability to stretch materials is the division's salvage department which began operations in 1935. Last year, this department recovered for further use in the production of appliances more than 23,000 tons of steel and more than 815,000 pounds of non-ferrous metals.

Paper cartons which could not be returned to suppliers were cut, scored, wrapped with new paper and shaped into protective shipping pads. This process resulted in the production of 80,000 pads per month. In 1950, 40,000 board feet of lumber were recovered—enough lumber to crate 3,300 refrigerators.

Over 160,000 gallons of paint were recovered by using water wash paint spray booths that collect the excess paint that might otherwise be lost. Such paint is reprocessed and is suitable for many production operations.

### Research Engineers Constantly Alert

Research and design engineers, constantly studying ways and means to conserve materials, have devised numerous plans for extending the use of supplies now available. A typical example is the program designed for conserving nickel used in plating processes. The plan suggests the use of synthetic organic finishes and bronze finishes instead of plating; the use of more available materials such as chromium and zinc instead of nickel plating; and the use of plastic instead of metal, where possible, in order to eliminate the requirements for nickel plating.

### Production Workers Contribute Ideas

The ingenuity of the men handling the production lines has resulted in valuable contributions to the program. Through the company's suggestion plan, employees have reduced waste and scrap loss on many important items.

One employe suggested that imperfectly plated toaster casings be stripped of their finish. As a result, a large quantity of toaster casings, which otherwise would be scrapped, were recovered over a year's period.

Another employe proposed an alternate use for bottom waffle grids where the hinge lugs were damaged in production operations. The lugs are removed and the grids used for top grids where lugs are not needed. This idea recovered many grids. Another employe suggested a change in the size of steel sheet to produce more blanks, thereby reducing the scrap loss.

J. H. Ashbaugh, vice president, stated, "The examples cited are but a few of the hundreds of employe suggestions received by the company each year," and added that "last year, the company accepted 31.3 per cent of the suggestions received. Awards to employes for their ideas totaled more than $11,600."

Engineers, too, came up with new methods of using materials to conserve scarce materials such as nickel and copper. A new clutch plate for the Laundromat automatic washer transmission now uses a copper sintered face that will save from 70 to 80 per cent of the copper used in the current multiple plate clutch. The new design also improves the performance of the transmission unit that controls the speed of the washing tub in the Laundromat from 52 rpm to almost 500 rpm.

The use of copper brazing paste instead of solid copper wire in furnace brazing of Laundromat and other appliance parts has not only saved copper but has reduced costs with no cut in quality.

Silicon-resin impregnated glass cloth has been developed for electrical insulating washers on thermostats. The silicon-resin impregnated glass cloth replaces the mica and permits an improved design for this part because the silicon glass has better physical and mechanical properties.

"At no point in these material changes," Mr. Ashbaugh said, "has quality or performance been sacrificed for the sake of lower costs or the need for substitution. Actually these replacements are in many cases giving us better performance and in none have they lowered performance."

---

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## Defense Production Inquiry Center

To provide information on defense production to business representatives in the Washington area, two top defense agencies, the National Production Authority, U. S. Department of Commerce and the Defense Production Administration, has put a new information center into operation in the main lobby of the old GAO Building, Fifth and G Streets, N.W.

The new Inquiry Center is not intended to encourage businessmen to come to Washington with defense production problems, officials emphasized. It is designed to assist individual business men, or their representatives in Washington, by providing a central place to get quick answers to their questions. Businessmen in other areas will continue to get information from field offices of the Department of Commerce.

The Inquiry Center is staffed by persons who have either specialized industrial background or governmental experience in particular fields. They are familiar with all phases of a particular industry's problems. They can either furnish information to business representatives or arrange appointments with NPA or DPA operating officials who can supply particular data.

Currently more than 2500 telephone and personal calls are answered each day by reception centers now located in various units of DPA and NPA. It is expected that the new Inquiry Center will handle approximately 3000 personal and telephone inquiries daily as the tempo of defense mobilization accelerates.

In the middle of the first floor of the old GAO Building there is a large circular reception desk where a staff can answer routine questions and direct inquiries to persons who can supply special information. A complete file of orders, regulations, forms, publications and similar material of defense agencies is also maintained here.

Stationed near the reception desk is a staff of industrial specialists who can supply information on specialized problems.

This procedure, DPA and NPA officials believe, is expected to reduce delays to a minimum.

The new Center is directed by K. H. Bristol, Former Lt. Colonel in the Army Chemical Corps and recently special assistant to the Director of Production, National Security Resources Board.

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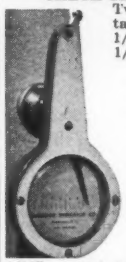

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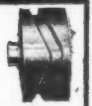

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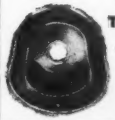

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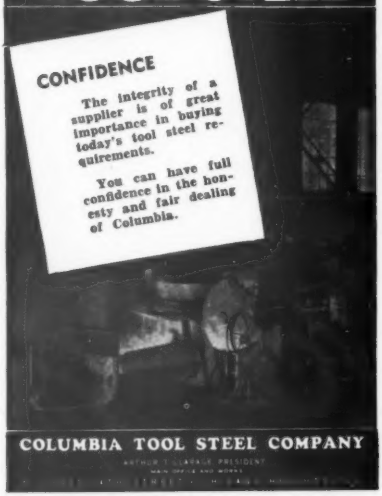
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# PROGRESS

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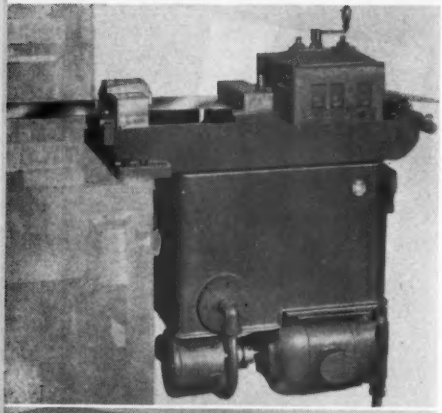
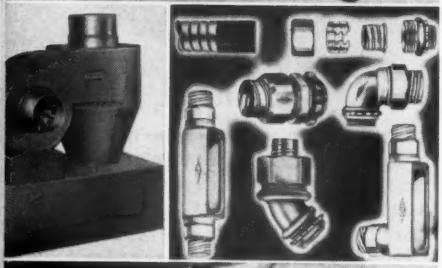
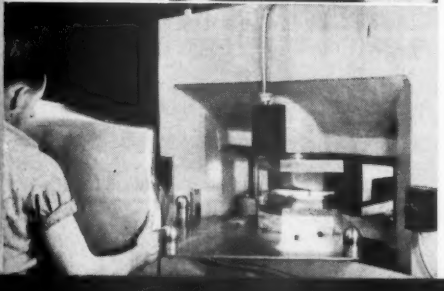


**A New Haller Gripper Type Stock Feed** has been introduced. For use on almost any punch press, Model 8FTS is hydraulically operated, can handle stock up to 8" wide and can feed any desired length up to 24". Accuracy of feed is guaranteed within .003" to .005" on each stroke. This stock feed can be moved readily to other presses when desired. SPECIAL ENGINEERING SERVICE, INC., 8161 Livernois Ave., Detroit 4, Mich.
**Circle Inform-A-Gram No. A1.**

**Bellows' HAN-D-AIR CLAMP** is a 1⅛" bore, 1" stroke, single-acting, spring return small air cylinder developed primarily for use in jig and fixture operations and for parts positioning and ejection. It has a power factor of 1:1, developing a thrust approximately equal to the applied air pressure. Compact in design, the unit can be mounted in practically any position. THE BELLOWS CO., Box 631, Akron, Ohio.
**Circle Inform-A-Gram No. A2.**



**A Bantam Size, Filterless Dust Collector** (outside cut) has been designed by Aget-Detroit for use where remotely located dust sources have toxic fumes, vapors or obnoxious odors. This new Model 4N20, smallest DUSTKOP out-of-doors exhaust type unit, develops a rated 437 cfm and 5000 fpm velocity at the inlet. This amount of suction is adequate to handle a buffing or grinding wheel up to 10" diameter, or two wheels for similar work from 3" to 7" diameter. AGET-DETROIT CO., 213 Main St., Ann Arbor, Mich.
**Circle Inform-A-Gram No. A3.**



**Vap-Oil-Tite Fittings** (inside cut) are designed to connect synthetic covered flexible metallic conduit that is widely used in machinery and equipment wiring. These positive ground fittings are liquid and vapor tight. Vap-Oil-Tite fittings and bodies are furnished in sizes from ⅜" to 2". SIMPLET ELECTRIC CO., 3602 Potomac Ave., Chicago 51, Ill.
**Circle Inform-A-Gram No. A4.**

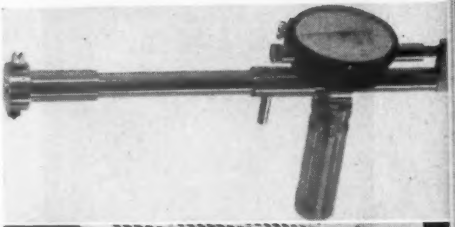
**Vulcan-Draw** is a quick-change method for producing sheet metal corners. This method constitutes the drawing of a single corner from flat sheet, one corner at a time, in a press specifically designed for such an operation. The corner thus formed is complete with the exception of notching or trimming, whichever the case may be as far as the end product is concerned. Vulcan-draw eliminates the need for expensive hand operations, as well as for separate dies or sets of dies for each panel size. VULCAN TOOL CO., 730 Lorain Ave., Dayton 10, Ohio.
**Circle Inform-A-Gram No. A5.**

# ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

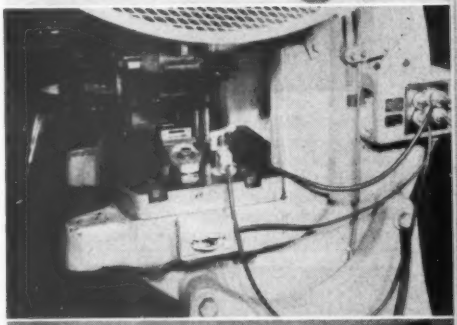
**The Rimat Internal Thread Comparator** measures from the pitch line of any one thread in a "nut" to the pitch line of the two threads lying diametrically opposite it. When set to a basic gage ring, it gives ± deviations from the basic pitch. The indicator reading is in tens of thousandths, and for any one setting, the instrument has a range of ± .003". RIMAT MACHINE TOOL CO., 1117 Air Way, Glendale 1, Calif.

**Circle Inform-A-Gram No. A6.**



**The U. S. Multi-Stop** is essentially a protective device to safeguard presses, machines, tools and dies. It can stop machine automatically: (1) at the end of a coil or strip; (2) if stock buckles between feed unit and die; (3) if thickness or (4) width of stock varies beyond specified limits; (5) if short feed occurs. Besides the punch press application shown, the Multi-Stop is adaptable to other machine setups. U. S. TOOL CO., INC., Dept. T&P, Ampere (E. Orange), N. J.

**Circle Inform-A-Gram No. A7.**



**The Techno Precision Vernier Caliper** permits accurate inside, outside and depth measurements. Lower scale is graduated to 6", measures work up to 5-5/16" in vernier readings of .001". Upper scale is graduated to 160 mm, measures up to 135 mm in vernier readings of 1/20 mm. A design feature eliminates inaccurate measurements caused by "closing-up" and "opening-up." TECHNO EXPORTS, 15 Whitehall St., New York 4, N. Y.

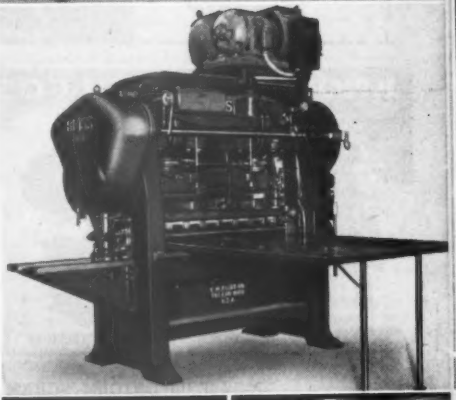
**Circle Inform-A-Gram No. A8.**

**Bliss No. 8150 Perforating Press** punches slots, rounds or ovals, either in straight rows or with alternating rows staggered. This 150-ton press operates in a speed range from 100 to 200 spm with a variable speed drive. The stagger motion is accomplished by feeding the sheet straight through the press and by moving the punch and die from side to side. E. W. BLISS CO., 1377 Raff Rd., Canton, Ohio.

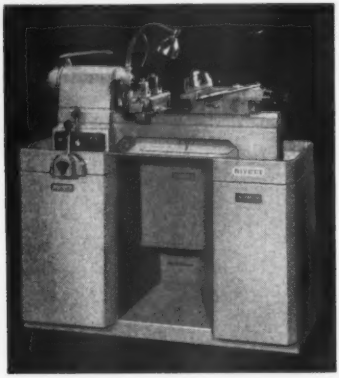
**Circle Inform-A-Gram No. A9.**

**When Handling Bundles** of square or nearly square steel sheets, the load is concentrated in a relatively small area while the height of the bundle is greater than for large sheets. This makes desirable a sheet feeding table of short over-all length with a maximum elevation range. The new Lyon-Raymond Hydraulic Sheet Feeding Table has a scissors-type lifting mechanism. Over-all length of the top is only 66" but the table elevates from 18" in the lowered position (left) to 36" when elevated (right). LYON-RAYMOND CORP., 96-81 Madison St., Greene, N. Y.

**Circle Inform-A-Gram No. A10.**



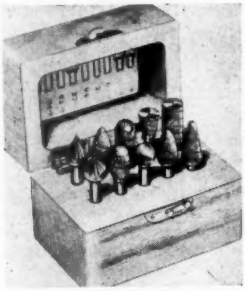
**Rivett 918-S Turret Lathe** is a 9" swing machine for fast production of small duplicate



parts to interchangeable limits. Well-grouped controls permit instant selection of variable cutting speeds from 90 to 3750 rpm, and a convenient automatic chuck closer with switch, controls spindle drive and brake. Collets have double bearing spacing for greater precision and increased gripping power. RIVETT LATHE & GRINDER, INC., Dept. T&P, Brighton 35, Boston, Mass.

**Circle Inform-A-Gram No. A11.**

**New S & E Tungsten Carbide Rotary Cutters** are offered in ten shapes, each in diameters of 1/8", 1/4", 3/8" and 1/2". All are completely form cutting with cutting edges



following the entire form. They are available individually or in sets. For descriptive literature write to S & E MACHINE PRODUCTS, INC., Dept. T&P, Bridgeport, Mich.

**Circle Inform-A-Gram No. A12.**

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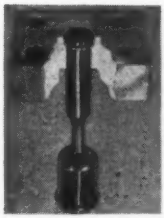
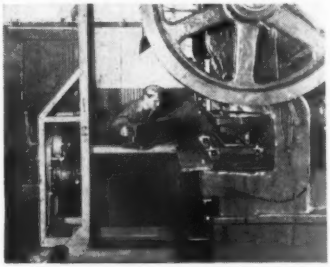


**Ring Piercing Punches and Button Dies.** A standard line of these punches and dies is now offered by Producto Machine Co. The Ring design takes the place of the conventional punch head, providing better concentricity. PRODUCTO MACHINE CO., 970 Housatonic Ave., Bridgeport, Conn.

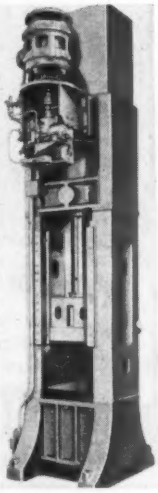
**Circle Inform-A-Gram No. A13.**

**Serving Die to Press** by means of a Barrett hand-operated portable elevator is shown below. This portable elevator is also used to move dies from presses to die racks. Its adjustable height eliminates lifting of heavy dies. BARRETT-CRAVENS CO., 4609 S. Western Blvd., Chicago 9, Ill.

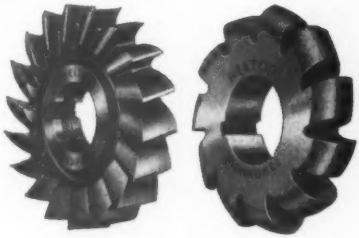


**Inform-A-Gram No. A14.**

**New Elmes Hydraulic Presses** feature a pipeless circuit construction. The main hydraulic circuit has no piping. The only pipes in the entire press are the pilot, suction and drain lines, and of these, only the pilot line carries high pressure. All main circuit high-pressure fluid is conducted through short, direct passages drilled in the structural parts. Advantages of this construction include smoother, quieter operation and lower-cost maintenance. AMERICAN STEEL FOUNDRIES, Elmes Engineering Div., 1171 Tennessee Ave., Cincinnati 29, Ohio, can provide detailed information on these presses.



**Inform-A-Gram No. A15.**



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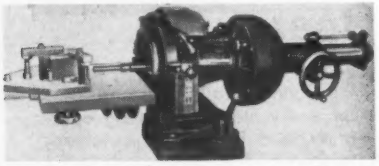
**The New Scully-Jones Flush Pin Gage** is used for pre-setting drills, taps, reamers, countersinks and other tools that have been inserted in adjustable adapters before being placed in machine spindles. It is made of cast iron with three hardened jig feet, hardened bushing and pin. SCULLY-JONES & CO., 1913 S. Rockwell St., Chicago 8, Ill.

**Circle Inform-A-Gram A16.**

**Hydro-Borers.** New models of these precision horizontal hydraulic boring machines meet work tolerances to ±.0003" and finishes to aircraft specifications. Boring capacities range from ⅝" to 6½" diameter and portability is emphasized in that models weigh only 200 to 300 lbs. Work is stationary and only the boring tool revolves. The surface to which the work fixtures mount is hand scraped to .0003" of square and at 90° to the spindle. Work-holding fixtures can be mounted on the face of the Hydro-Borer and precision finished on the machine itself. HYDRO-BORER CO., Dept. A-57, 1511 W. Florence, Inglewood, Calif.

**Circle Inform-A-Gram A17.**



**The Speedex 5-Ton Dial Feed Press** utilizes Speedex Model A-12 Index Feed, which assures positive and accurate indexing at each stroke of the press. This multi-purpose, production press operates at from 40 to 100 strokes per minute. The index plate is interchangeable, can be converted from one operation to another in a few minutes. Standard stroke is 1"; maximum, 2". DE CASTRO & ASSOCIATES, 1517 Santa Fe Ave., Los Angeles 21, Calif.

**Inform-A-Gram No. A18.**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. . . the grunt-pull, hammer-wrecking bar, costly method of die separation . . . using two or three men? Results are pinched fingers, scored pins, battered dies and waste of time and money.

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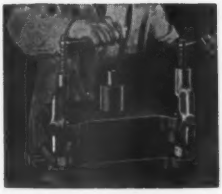

*List of users on request.

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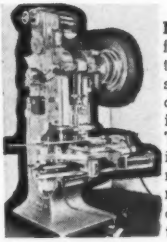
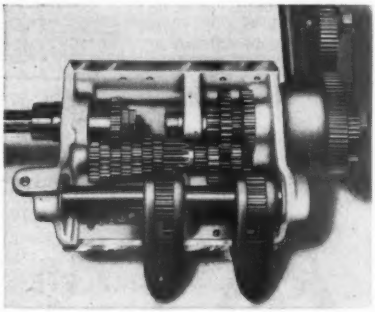


**The V & O Segmental Notching Press** is used for notching rotor or stator segments of the larger sizes that cannot be handled on the conventional index ring type fixture. This press is simple and inexpensive to tool-up and maintain for the various number of notches required. Detailed information as to operation, etc., can be had from V & O PRESS CO., Div. of Hartford-Empire Co., Dept. T&P, Hudson, N. Y.

**Circle Inform-A-Gram No. 19.**

**An Improved Quick Change Gear Box** (interior view shown) is announced for South Bend Lathes. Having a minimum number of parts and being fitted with ball and



needle bearings, it requires less power and is much sturdier than other designs. This gear mechanism is of the double tumbler type. For complete data, write SOUTH BEND LATHE WORKS, Dept. T&P, South Bend 22, Ind.

**Circle Inform-A-Gram No. A20.**

**A New 20-Ton Hydraulic Press** is announced by Ross & Co. This motor driven press is designed for assembling, broaching, crimping, drawing, forming, laminating, riveting and general forcing operations. It is double acting and has an 8" throat and a ram travel of 12". Clearance under the retracted ram is 16". Write to ROSS & CO., 1401 E. 57th St., Chicago 37, Ill., for details on this new press.

**Inform-A-Gram No. A21.**

Nu-Process
B-RIGHT-ON
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PRODUCTS
Brighton Nu-Process Socket Screws are produced by new methods recently developed to make better screws faster.
Alloy steel is cold worked to form a continuous compact structure. In addition much closer tolerances are maintained.
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Cincinnati 2, Ohio


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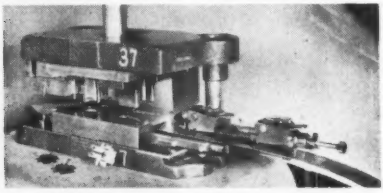
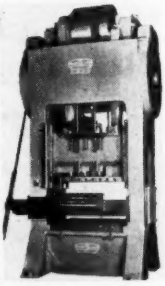
**A New Line of Reid Transfer Buttons** for transferring blind unthreaded spring pocket holes in dies to new work quickly and accurately is announced. The transfer buttons can easily be fastened securely in the holes to be transferred. The piece holding the buttons on the work is then placed on the work in which the holes are to be transferred, a sharp blow is struck and the true center is recorded. REID TOOL SUPPLY CO., 709 Baker St., Muskegon Heights, Mich. **Circle Inform-A-Gram No. A22.**

**The New Dickerman 2½" Hitch Feed** is illustrated mounted directly on the die set, a theory and practice pioneered by the manufacturer. This feed handles coil stocks from .005" to .050" thick and up to 5" wide in practical combinations. In this case the hitch feed is feeding .035" spring steel, 1-15/16" wide, to a five-station progressive die. H. E. DICKERMAN MFG. CO., 321 Albany St., Springfield, Mass.

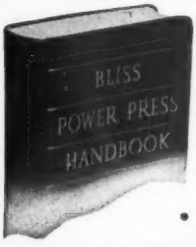



**Circle Inform-A-Gram No. A23.**

**This Cleveland Two-Point Press,** No. 2S-300-60-42, is a double geared twin drive unit equipped with electrically controlled, air-operated Cleveland drum-type friction clutch with spring loaded brake. The press, which is equipped with a single roll feed and arranged with a pneumatic cushion in the bed, has a stroke of 12"; adjustment of slide 8", distance bed to slide, stroke down adjustment up 42". THE CLEVELAND PUNCH & SHEAR WORKS CO., 3917 St. Clair Ave., Cleveland 14, Ohio, will supply details.



**Circle Inform-A-Gram No. A24.**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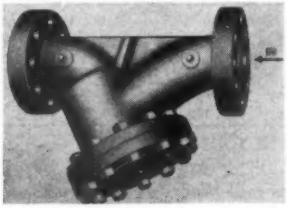
**Dayton Rogers Micrometer Adjustable Spacing Collars** for milling machine cutters arbors are now made of a new special alloy which, together with an improved screw thread system, make it possible for these collars to take a thrust of 25 tons and still maintain precision micrometer accuracy. Standard sizes are now made from ⅝" to 2½". DAYTON ROGERS MFG CO., 2824-13th Ave. South, Minneapolis 7, Minn.
**Inform-A-Gram No. A25.**

**High Pressure Hydraulic Strainers** (up to 1500 psi) are designed by C. B. Hunt & Son to be placed in the line ahead of descaling spray nozzles. They prevent the passage of small foreign particles that could block the orifices of the spray nozzles, and consequently enable the nozzles to operate at full efficiency,



thus preventing scale streaks, reducing product rejects and prolonging the life of dies, rolls and other forming equipment. C. B. HUNT & SON, INC., 2200 E. Pershing Ave., Salem, Ohio.
**Inform-A-Gram No. A26.**

**The AH Tester** is a portable, scleroscope type of instrument that depends upon the bounce of a falling hammer to measure the elasticity of a sample of material. In the ranges in which industry is chiefly interested, the curves of elasticity and hardness are approximately parallel and, therefore, it becomes also a measure of hardness. THE AH TESTER CO., INC., Dept. T&P, Brighton, Mich.
**Inform-A-Gram No. A27.**

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18,000 RPM

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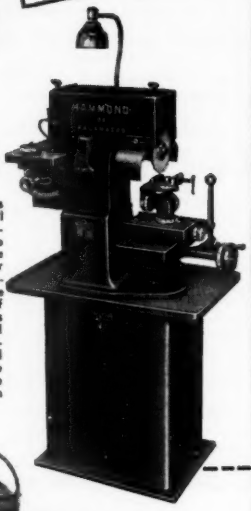

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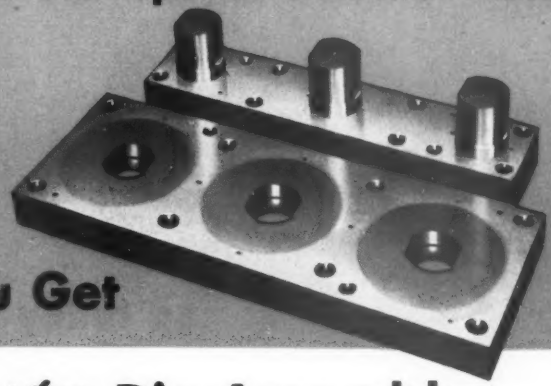

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John Ruskin

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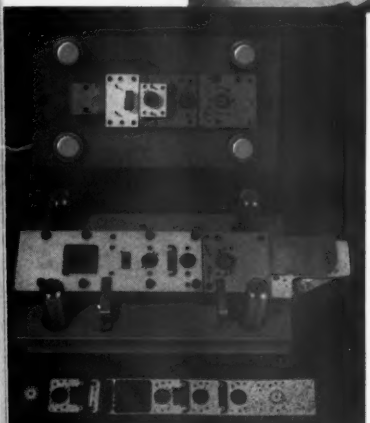

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